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(54) Unpacking device

(57) The invention relates to a device for unpacking elements packed as a roll in a flexible packaging, which device comprises:

- supply means (3) for supplying a roll of packed elements (7) from a first buffer (2);
- cutting means (4) for cutting through the packaging of the roll along the whole length;
- removing means (5) for removing the cut packaging;
- first transport means (10) for transporting the roll from the first buffer to the removing means;
- second transport means (6) for transporting the unpacked elements from the removing means to a second buffer (29); and
- discharge means (33,34) for discharging the elements from the second buffer (29) to an already existing continuous flow of elements (32).

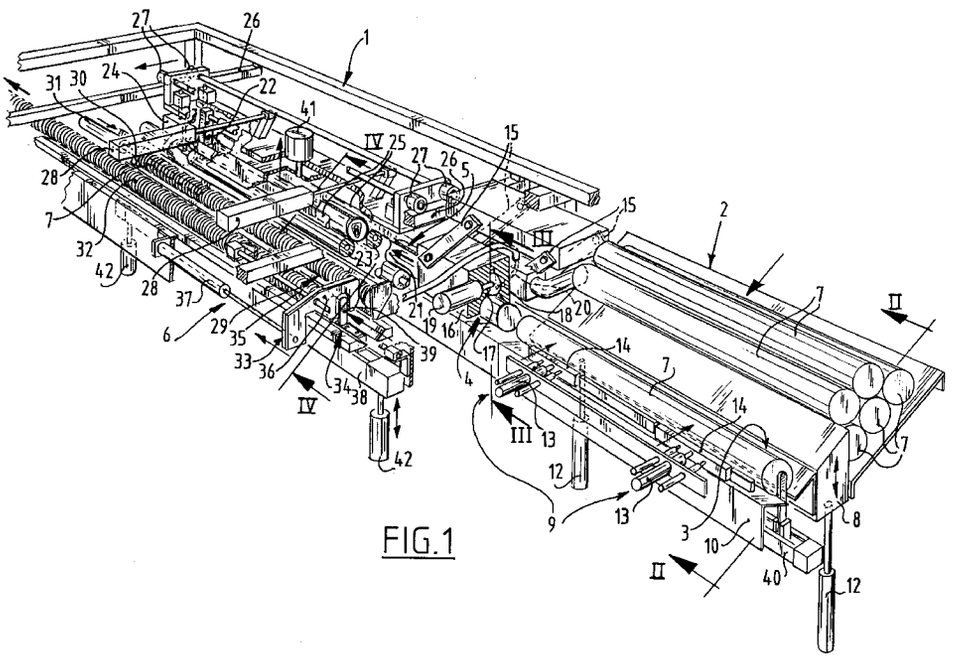

FIG.1

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Description

[0001] The invention relates to a device for unpacking elements packed as a roll in a flexible packaging, which device comprises:

- supply means for supplying a roll of packed elements from a first buffer;
- cutting means for cutting through the packaging of the roll along the whole length;
- removing means for removing the cut packaging;
- first transport means for transporting the roll from the first buffer to the removing means;
- second transport means for transporting the unpacked elements from the removing means to a second buffer; and
- discharge means for discharging the elements from the second buffer to an already existing continuous flow of elements.

[0002] With this device discretely supplied elements packed in their flexible packaging are unpacked and fed to a continuous flow without elements situated at the outer ends of the roll falling over, whereby the device could be blocked.

[0003] In a preferred embodiment a cutting head is present which comprises a suction mouth and a knife arranged therein. The cutting head is placed on the roll and the packaging is then sucked up by the suction mouth such that the packaging comes against the knife, which subsequently cuts therethrough. The packaging is hereby cut in advantageous manner without the possibility of the elements being damaged by the knife.

[0004] According to a preferred embodiment the removing means comprise two rollers rotating in opposing directions which pull the packaging from the roll. Two adjustable stops are present herein which prevent the elements situated at the outer ends of the roll from tipping over.

[0005] The second transport means preferably comprise two gripping elements, at least one of which is an inflatable element, which gripping elements can engage a roll of elements. The elements are not damaged by the inflatable element.

[0006] In a further preferred embodiment the discharge means comprise at least one drive, one first pressing member and one second pressing member. At the moment that a new roll of unpacked elements is fed to the continuous flow the first pressing member will press on the continuous flow. The second pressing member will return in a retracted position to a starting position where it takes over the pressing from the first pressing member. This latter will then return to its starting position. The continuous flow of elements is hereby pressed at all times.

[0007] These and other features are further elucidated with reference to the annexed drawings.

Figure 1 shows a perspective view of a preferred embodiment of the device;
Figure 2 shows a cross-section II-II of the supply means and first transport means of the device of figure 1;
Figure 3 shows a cross-section III-III of the cutting means of the device of figure 1;
Figure 4 shows a cross-section IV-IV of the removing means and discharge means of the device of figure 1.

[0008] Figure 1 shows a preferred embodiment of the device according to the invention. This device comprises a frame 1 in which a first buffer 2 is arranged, supply means 3, cutting means 4, removing means 5 and second transport means 6. Further arranged in the frame are first transport means, a second buffer and discharge means.

[0009] Figure 2 shows a cross-section through the first buffer 2 in which lies a roll of covers 7 packed in a flexible packaging, through supply means 3 and the first transport means. The supply means comprise a lift 8 for lifting a packed roll of covers 7 out of first buffer 2, and cylinder 9.

[0010] The first transport means consist of a conveyor chute 10 and a pin 11 movable through this chute.

[0011] Lift 8 of supply means 3 is moved in vertical direction by a cylinder 12. The ejecting cylinder 9 comprises an operating cylinder 13 and knock-out beams 14 moved thereby in the horizontal plane.

[0012] In buffer 2 are placed packed rolls of covers 7 which, due to the inclination of buffer 2, roll towards the side of the lift. In a retracted position of lift 8 at least one roll 7 will roll onto the upper surface of lift 8. By operating cylinder 12 the lift will move vertically upward and place a roll 7 in conveyor chute 10. When lift 8 returns to the retracted position the ejecting cylinders 9 will apply a short impact to the roll 7 placed in conveyor chute 10 so that a possible second roll is knocked out of the conveyor chute back into the first buffer 2.

[0013] It is however also possible to embody the lift such that a maximum of one roll can be lifted into conveyor chute 10, wherein a detection is provided to detect the presence of the roll.

[0014] The pin 11 of the first transport means then transports the packed roll of covers to cutting means 4. Pin 11 can be driven for instance by means of a screw spindle or a pneumatic cylinder 40.

[0015] The cutting means are arranged pivotally on frame 1 by means of arms 15. The cutting means can hereby be adapted to the diameter of the packed roll and a good contact of the cutting means against the packed roll of covers is obtained.

[0016] Figure 3 shows a cross-section through cutting means 4. These latter comprise a housing 16 which is adapted to the cross-section of the roll. Housing 16 comprises a recess 17 in which a knife 18 is arranged rotatably. This knife is driven by a motor 19. Air is extracted

from recess 17 via channel 20, whereby packaging 21 is drawn into recess 17. Packaging 21 is cut along the length through rotation of the knife and because the roll is being displaced through conveyor chute 10.

[0017] The roll of covers with cut packaging is subsequently placed via conveyor chute 10 into removing means 5. The roll there runs up against a stop 22. This stop 22 is adjustable to the length of roll of covers 7.

[0018] Figure 4 shows a cross-section of removing means 5 and second transport means 6. Removing means 5 comprise two rollers 23 which are rotatable in mutually opposing directions. The surface of the rollers has a high coefficient of friction and is preferably of rubber or like material.

[0019] As soon as a roll of covers 7 is carried into the removing means by first transport means 3 the pin 11 is moved back a short distance such that the packaging is not held fast by pin 11 and stop 22 and the covers at both outer ends cannot tip over. By now causing rollers 23 to rotate in opposing directions A respectively B relative to each other, packaging 21 is pulled off the roll of covers 7 and discharged in direction C between the two rollers.

[0020] Second transport means 6 comprise a housing 24 which is open on the underside. On the inside of housing 24 are arranged two inflatable flexible elements 25. The roll of covers 7 is clamped fixedly by now inflating both flexible elements 25. The housing is then raised together with the roll of covers by means of cylinder 41 and moved from a first position to a second position via a guide consisting of two parallel rails 26 and rollers 27 guided thereon. This is brought about by two pneumatic cylinders 28 (see figure 1).

[0021] By then creating a vacuum in flexible elements 25 the roll of covers 7 is placed in a second buffer 29. Buffer 29 is likewise provided with a stop 30 which can be adapted to the length of the rolls of covers 7. This stop can be operated by means of a pneumatic cylinder 31 (see figure 1).

[0022] As soon as the continuous flow of unpacked covers 32 has passed beyond a determined point, the unpacked roll of covers 7 from the second buffer 29 can be fed by the discharge means to the continuous flow of covers 32.

[0023] Figure 1 shows the discharge means which comprise a first pressing member 33 and a second pressing member 34. First pressing member 33 comprises a plate 36 which is guided by a rod 35 and can be operated by a pneumatic cylinder 37.

[0024] Second pressing member 34 comprises a rodless cylinder 38 on which a finger 39 is movably arranged.

[0025] Once the roll of covers 7 has been fed from second buffer 29 the plate 36 will be controlled by cylinder 37 such that the roll of covers 7 is pressed against the continuous flow of covers 32. Finger 39 will subsequently move back under the roll of covers 7 to a starting position. Second pressing member 34 is herein carried downward by cylinders 42 so that finger 39 can move back without making contact. At the starting position the finger 39 will take over pressing of the roll of covers 7 from plate 36. Provided for this purpose in the plate is a recess through which the finger can move. Plate 36 will then move back to a starting position so as to be able to press on a following roll of covers 7.

[0026] The advantage of pneumatically controlled pressing members is that a constant pressing force is exerted irrespective of the path covered. This prevents the continuous flow of covers being damaged by disturbances.

Claims

1. Device for unpacking elements packed as a roll in a flexible packaging, which device comprises:
   - supply means for supplying a roll of packed elements from a first buffer;
   - cutting means for cutting through the packaging of the roll along the whole length;
   - removing means for removing the cut packaging;
   - first transport means for transporting the roll from the first buffer to the removing means;
   - second transport means for transporting the unpacked elements from the removing means to a second buffer; and
   - discharge means for discharging the elements from the second buffer to an already existing continuous flow of elements.

2. Device as claimed in claim 1, **characterized in that** the cutting means comprise a suction mouth and a knife arranged therein such that the knife cuts through the packaging drawn in by the suction mouth during a relative displacement of a roll therealong and the edge of the suction mouth holds the elements out of reach of the knife.

3. Device as claimed in claim 2, **characterized in that** the suction mouth is adapted to the cross-section of the roll and has a recess in which the knife is arranged such that the elements are held outside the recess and the knife only cuts through the packaging.

4. Device as claimed in claim 2 or 3, **characterized in that** the knife is rotatably drivable.

5. Device as claimed in claim 1, **characterized in that** the second transport means comprise at least two elongate, selectively energizable gripping elements which can each engage a whole long side of the roll.

6. Device as claimed in claim 5, **characterized in that**

at least one gripping element is an inflatable element.

7. Device as claimed in claim 5 or 6, **characterized in that** the transport means comprise an adjustable stop.

8. Device as claimed in claim 1, **characterized in that** the discharge means comprise at least one drive, one first pressing member and one second pressing member, wherein the first pressing member presses the continuous flow of elements in a first path and the second pressing member presses the continuous flow of elements in a second path.

9. Device as claimed in claim 8, **characterized in that** during feeding of the elements from the second buffer to the continuous flow of elements the first pressing member lies in a starting position and the second pressing member presses the continuous flow of elements.

10. Device as claimed in claim 8 or 9, **characterized in that** immediately after feeding of elements from the buffer the first pressing member presses the continuous flow of elements and the second pressing member moves back to a starting position where the second pressing member takes over pressing from the first pressing member.

11. Device as claimed in claim 1, **characterized in that** the supply means comprise a lift element for lifting a packed roll of elements out of the first buffer and a knock-out element for ejecting a possible additional roll out of the first transport means.

12. Device as claimed in claim 1, **characterized in that** the removing means comprise two rollers rotatably drivable in mutually opposing directions.

13. Device as claimed in claim 12, **characterized in that** the rollers are covered with a rubber layer.

14. Device as claimed in claim 12, **characterized in that** the removing means further comprise an adjustable stop which can be adapted to the length of the packed roll of elements.

15. Device as claimed in claim 1, **characterized in that** the first transport means comprise a conveyor chute and a finger displaceable through the chute for displacing a packed roll of elements.

16. Device as claimed in claims 14 and 15, **characterized in that** after feeding of a roll of elements into the removing means the finger is moved back over a short distance in order to hold the packaging clear of the stop and the finger.

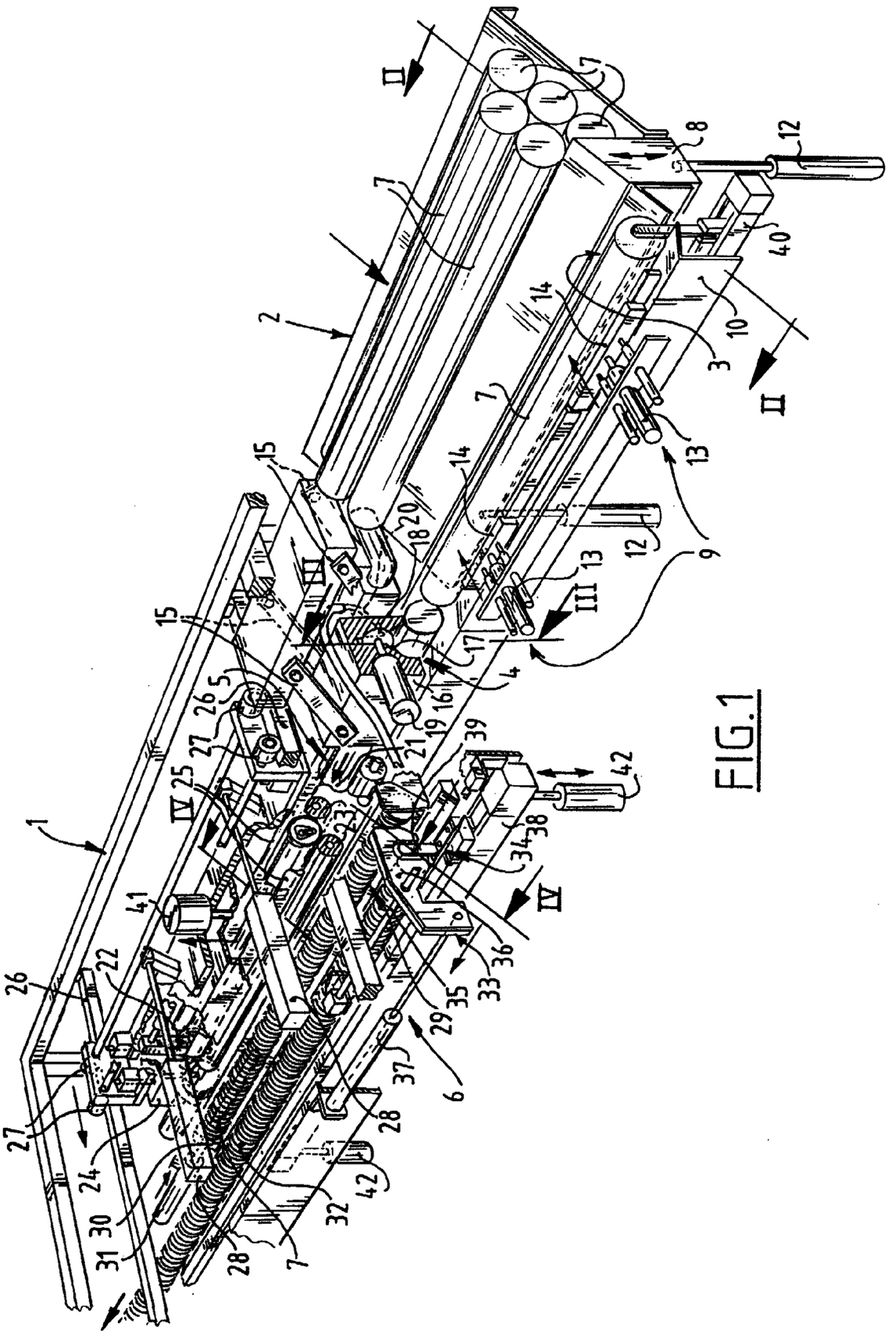
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FIG.1

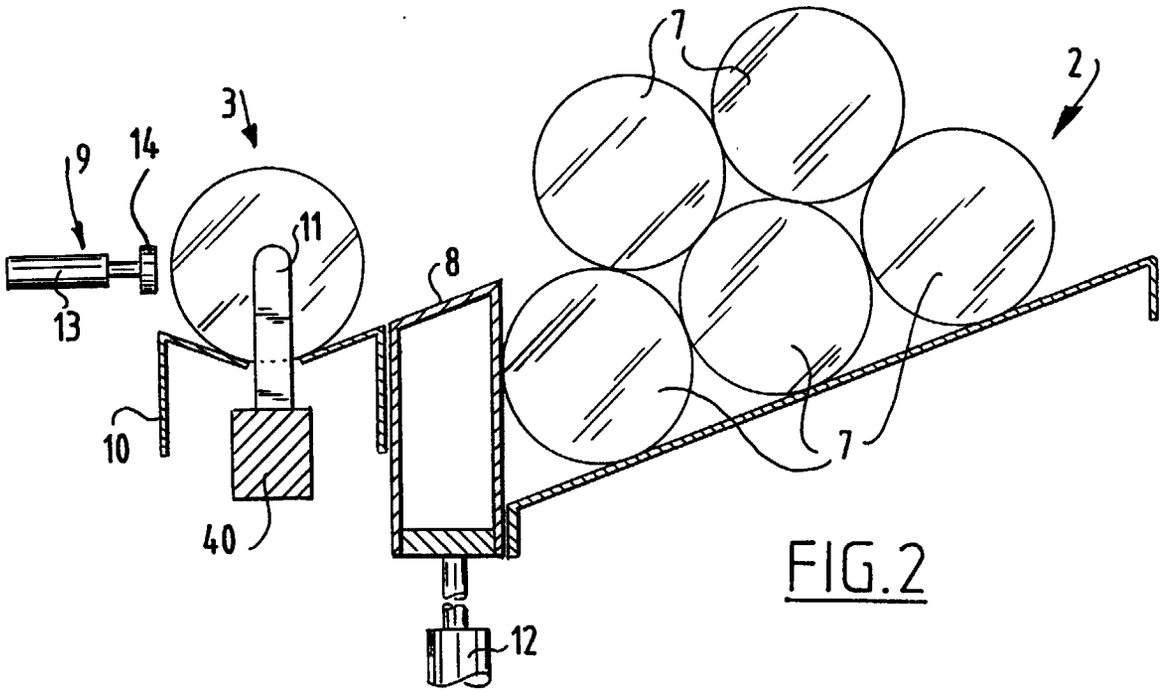

FIG.2

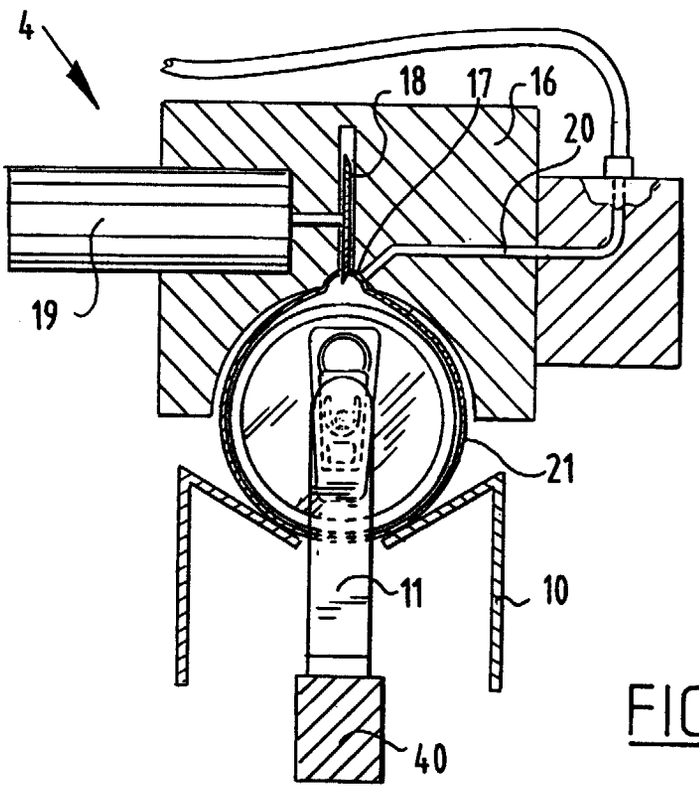

FIG.3

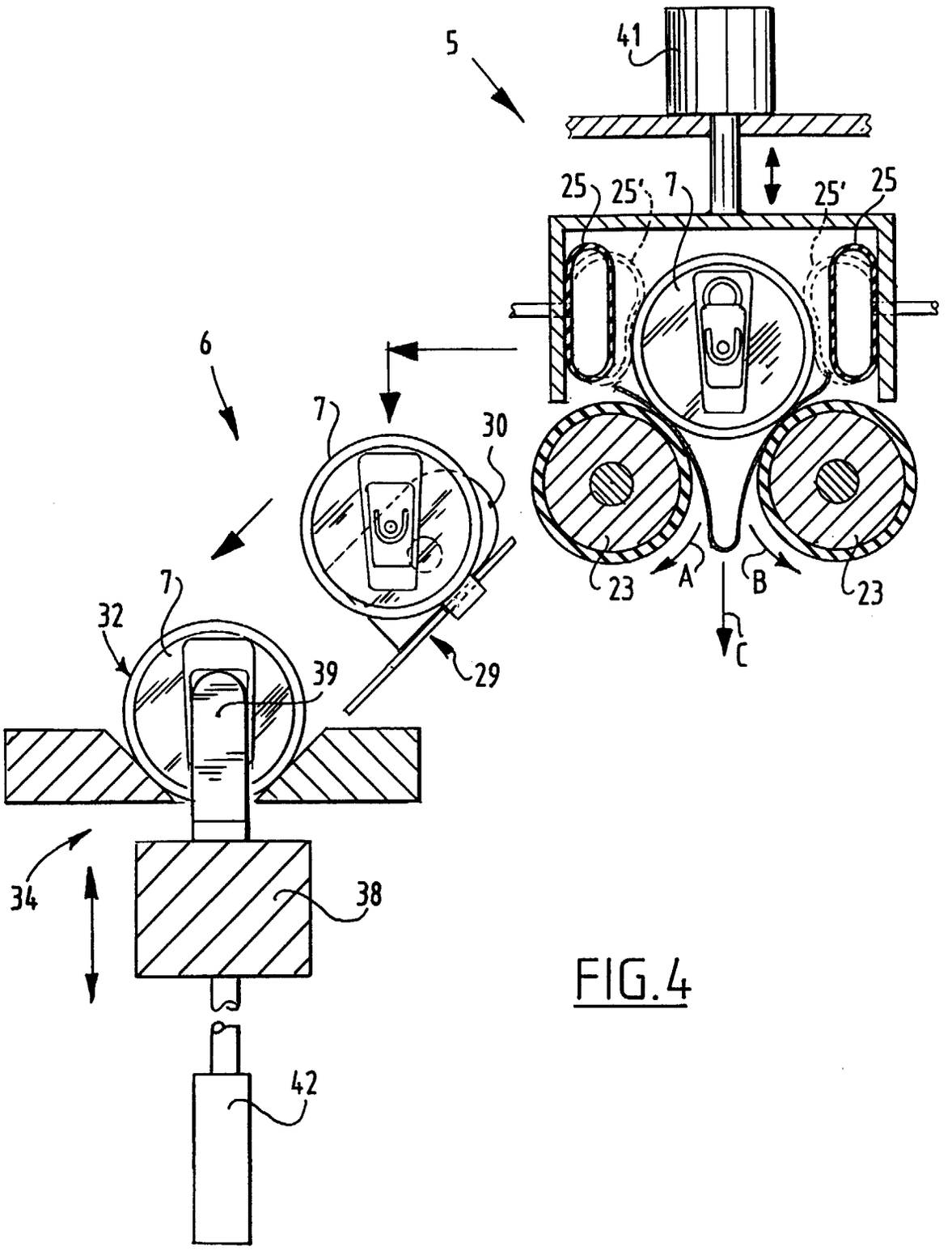

FIG.4

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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 1000

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	NL 9 400 897 A (KIRIN BEER) 16 January 1995 * page 12, line 1 - page 16, line 12; figures *	1-5,7,8, 12,14	B65B69/00
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TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	23 June 1999	Jagusiak, A

CATEGORY OF CITED DOCUMENTS

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