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(11)

EP 3 476 796 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.05.2019 Bulletin 2019/18

(51) Int Cl.:
B67B 3/06 (2006.01) B67B 3/20 (2006.01)

(21) Application number: **17199215.9**

(22) Date of filing: **30.10.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(54) **A METHOD AND CAP FEEDING DEVICE FOR APPLYING CAPS TO A NECK OF A CONTAINER**

(57) A method of applying a cap (12) to a neck (14) of a container (16) comprising the steps of retaining a cap (12) in a position inclined in relation to a horizontal plane and catching said cap while moving a cap feeder (24). Cap feeder (24) supporting said cap (12) is then moved to a position over containers (16) and said cap (12) is lifted. Said cap feeder (24) is moved away from

the position over conveyor (26) to allow said cap (12) to be lowered to a position engaging said neck (14) of container (16).

A drive mechanism (30) supports cap feeder (24) and is arranged to move cap feeder (24) between different positions where cap (12) caught and delivered, respectively.

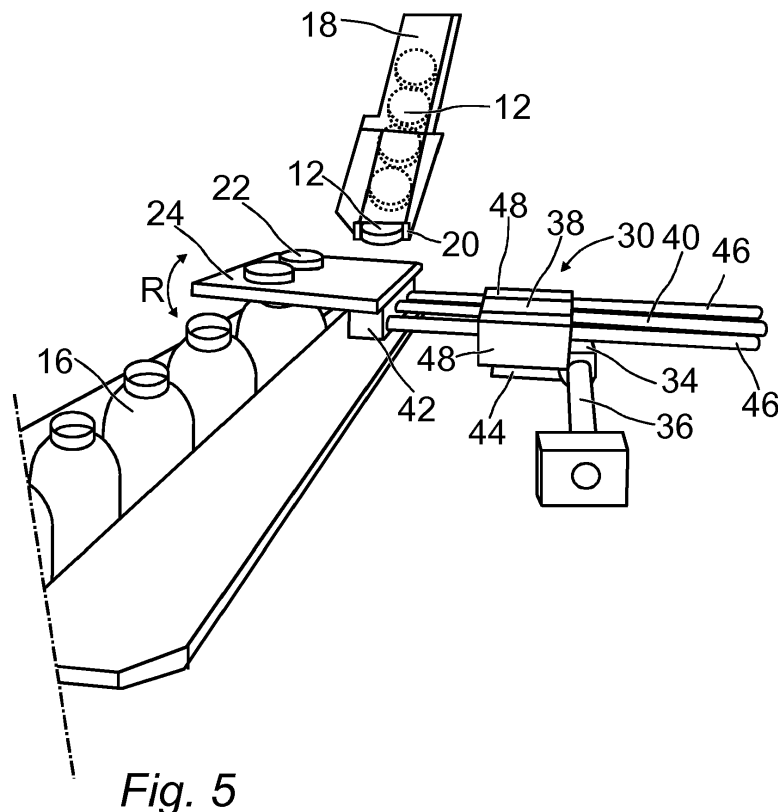


Fig. 5

EP 3 476 796 A1

Description

TECHNICAL FIELD

[0001] The invention relates to a method and cap feeding device for applying a cap to a neck of a container. This type of devices comprises a conveyor, a package transport system, a chute or cap dispenser and a gripper or cap holder for attaching or rotating the cap on a neck of the container. Threaded caps are rotated on a threaded neck of the container while so called push-on caps are pressed onto a non-threaded neck of the container.

[0002] Packages of this type are generally used in connection with packages for liquid chemicals, motor oil, hygiene products, pharmaceuticals or foodstuff, such as milk, juice, water, yoghurt and similar, but can be used for other types of packages with or without a threaded neck. One common type of packages of this type is plastic packages having a neck and a cap of plastic materials.

PRIOR ART

[0003] There is a plurality of different types of devices for applying a threaded cap to a threaded neck of a package by means of machines having grippers, in a turret or a machine that stops movement of packages while caps are tightened. Caps are supplied via a star wheel or from a chute. Another type of device comprises a conveyor and a pair of package supporting belts for transporting packages in a travel direction, wherein a cap is supplied to the top of the neck when the package passes a cap dispenser. Then, the cap is tightened by means of a cap tightening device. For example, a line of packages is transported on a continuously operating conveyor, wherein the continuously conveyed packages at short intervals pass the cap dispenser and wherein caps at short intervals are tightened by means of the cap tightening belts. The arrangements used for obtaining caps from a dispenser or a chute and for moving caps to containers need improvements to increase efficiency and durability.

SUMMARY OF THE INVENTION

[0004] An object of the invention is to improve prior art methods and devices for applying a cap to a neck of a package. The invention relates to a method and cap feeding device for applying a cap to a neck of a package or container. In various embodiments the invention improves prior art methods and devices for applying a threaded cap to a threaded neck of a package. A cap feeder is provided with at least one carrier to catch the caps and feed them to a predetermined position, where grippers or cap holders can grip or fix the caps. The number of carriers is the same as the number of caps per process, normally one to four. The carrier is catching the caps from a chute or a dispenser in a predetermined inclined position. The caps are fixed in the chute/dispens-

er so when cap feeder is moving forward under the chute/dispenser, one cap at the time is caught by each carrier from a predetermined inclined position.

[0005] The cap feeder then moves to a position where grippers or cap holders can grip or hold the caps. This position is above a conveyor with packages. Packages may be provided with threaded necks. In this position the caps are put on the packages in a handover process. After the handover the cap feeder is returned in a parallel move to its position behind the chute/dispenser, prepared to catch new caps.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In order that the manner in which the above recited and other advantages and objects of the invention are obtained will be readily understood, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings.

[0007] Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

- Fig. 1 is a schematic perspective view of a first embodiment of a cap feeding device in accordance with the invention,
- Fig. 2 is schematic top view showing a motion pattern of a cap feeder of a cap feeding device in accordance with the invention,
- Fig. 3 is schematic top view showing a cap feeder of a cap feeding device in accordance with the invention in different positions during a process of catching caps and moving them on the cap feeder,
- Fig. 4 is schematic top view showing a cap feeder of a cap feeding device as shown in Fig. 3 in further positions during a process of moving the caps to a position where the caps are put on packages,
- Fig. 5 is a schematic perspective view of another embodiment of a cap feeding device in accordance with the invention, and
- Fig. 6 is a schematic side elevation view of the cap feeding device shown in Fig. 5.

DETAILED DESCRIPTION

[0008] In a basic embodiment of a cap feeding device 10 for applying a cap 12 to a neck 14 of a container or package 16 comprises a movable cap feeder 24 with carriers 22 as shown in Fig. 1 to Fig. 6. In various embodiments, cap feeder 24 has a flat upper side from which at least one carrier 22 extends. Carrier 22 is circular and an outer diameter of carrier 22 is adapted to and smaller

than an inner diameter of cap 12. As shown in Fig. 1 and Fig. 2, cap feeder 24 is rectangular and is provided with two carriers 22 arranged along a longer side of cap feeder 24. Caps 12 and necks 14 of container 16 can be threaded.

[0009] A chute 18 extending in an inclined direction in relation to a horizontal plane holds a plurality of caps 12 and is provided at a lowermost end section with a cap dispenser 20 holding the lowest cap 12 in the chute 18 in an inclined position in relation to a plane in which the cap feeder 24 is moving. In various embodiments chute is replaced by or combined with a dispenser. Chute is used to cover different embodiments including chute, dispenser or a combination of a chute and a dispenser. Containers 16 are transported by a conveyor 26 moving in a substantially linear transport direction T.

[0010] Cap feeder 24 moves in a cap feeding process along a path P as indicated in Fig. 2 starting in a first position A below chute 18. During movement to a second position B, cap feeder 24 catches a first cap 12 that is held by cap dispenser 20 in an inclined position in relation to a horizontal plane, c.f. Fig. 6. First cap 12 is drawn from the position in the chute 18 by a first carrier 22. After some further movement a second cap 12 that now is lowermost is caught by a second carrier 22 on the cap feeder 24. In various embodiments, cap feeder 24 is provided with three or more carriers 22, each capable of catching one cap 12 from chute 18 at the time.

[0011] In position B, cap feeder 24 supports two caps 12. In a further movement, cap feeder 24 moves to a third position C which is over conveyor 26 with containers 16 in upright positions with a neck in an uppermost section. In this position, or during movement in transport direction T, a lift mechanism comprising two grippers or cap holders 32 is lowered to pick up the caps 12 on cap feeder 24. Grippers or cap holders 32 can be rotated, so as to screw caps 12 onto containers 16, or pushed down into engagement with neck of containers 16 if caps are push-on caps. In various embodiments, lift mechanism with grippers or cap holders 32 will move along with conveyor 26 during this process as indicated by arrow M in Fig. 4. During movement as indicated by arrow M grippers or cap holders 32 will be lowered until caps engage necks 14 of packages 16. Grippers or cap holders 32 can also rotate during this movement if caps 12 and necks of containers 16 are threaded.

[0012] When grippers or cap holders 32 have removed caps 12 from cap feeder 24 it will leave the position over conveyor 26, so as to allow grippers or cap holders 32 to be lowered to containers 16 and move to a fourth position D. Cap feeder 24 then will move in a direction parallel to transport direction T but displaced a first distance X in transverse direction. First distance X of displacement is sufficient to allow grippers or cap holders 32 to be lowered to containers 16. Cap feeder 24 then will return to first position A to start cap feeding process over again. Cap feeder 24 is provided with an inclined section 25 at one end. Inclined section 25 is in front when cap feeder

moves in directions parallel to transport direction T. Inclined section 25 will ensure that cap feeder 24 does not capture a bottom most cap 12 when moving back to position A.

[0013] Cap feeder 24 is supported by a drive mechanism 30, c.f. Fig. 5, that is arranged to move cap feeder 24 along path P. In various embodiments, drive mechanism 30 comprises a first linear motor 34 operating along a first bar 36 extending in a direction in parallel with transport direction T. First linear motor 34 and first bar 36 has an operation length sufficient to cover movement of cap feeder 24 from first position A to second position B. First linear motor 34 is connected to a support plate 44. Drive mechanism 30 comprises also a second linear motor 38 that will move a second bar 40 a second distance Y in a linear movement in a direction perpendicular to transport direction T. Second linear motor 38 is supported by support plate 44. Second bar 40 is connected to a support bar 42 of cap feeder 24. In various embodiments, cap feeder 24 is connected to second bar 40 to allow a tilting movement of cap feeder 24 in relation to a horizontal plane as indicated by arrow R in Fig. 5.

[0014] Cap feeder 24 is connected also to two extending through bushings in two bushing blocks 48. Support rods 46 will ensure that cap feeder 24 will move in a horizontal plane when second linear motor 38 moves cap feeder 24. Chute 18 holds a plurality of caps 12, a bottom most sticking out partly from chute 18 at angle α in relation to horizontal plane. Caps 12 are all placed in chute 18 with an open end downwards to allow carrier 22 to catch one cap when cap feeder 24 passes by. In various embodiments, angle α is about 30 degrees or in interval 25-45 degrees.

[0015] While certain illustrative embodiments of the invention have been described in particularity, it will be understood that various other modifications will be readily apparent to those skilled in the art without departing from the scope and spirit of the invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the description set forth herein but rather that the claims be construed as encompassing all equivalents of the present invention which are apparent to those skilled in the art to which the invention pertains.

Claims

1. A method of applying a cap (12) to a neck (14) of a container (16), comprising the steps of

- a) retaining a cap (12) in a position inclined in relation to a horizontal plane,
- b) catching said cap (12) on a carrier (22) extending vertically from a cap feeder (24) by moving said cap feeder (24) from a first position (A) to a second position (B) in a horizontal plane while catching said inclined cap (12),
- c) moving said cap feeder (24) supporting said

- cap (12) to a third position (C) over a conveyor (26) moving in a horizontal plane in a travel direction (T) while supporting containers (16),
 d) lifting said cap (12) from cap feeder (24),
 e) moving said cap feeder (24) away from the position over conveyor (26) to allow said cap (12) to be lowered to a position engaging said neck (14) of container (16),
 f) while moving along in said travel direction (T) attaching said cap (12) on said neck (14) of container (16),
 g) moving said cap feeder (24) back to said first position (A).
2. A method as claimed in claim 1, wherein caps (12) and necks (14) are threaded and step of attaching threaded cap (12) to threaded neck (14) of container (16) comprises rotating said threaded cap (12) on said threaded neck (14) of container (16).
3. A method as claimed in claim 1, comprising moving said cap feeder (24) in a horizontal plane.
4. A method as claimed in claim 1 or claim 2, wherein positioning in said third position (C) said cap (12) vertically straight over said neck (14) of container (16).
5. A method as claimed in claim 1 or claim 2, comprising moving said cap feeder (24) away from the position over conveyor (26) in a direction perpendicular to said travel direction (T) and further on back to said position (A) in a direction in parallel with travel direction (T).
6. A cap feeding device (10) for applying a cap (12) to a neck (14) of a container (16), comprising
- a chute (18) supporting a plurality of caps (12), said chute (18) being arranged to hold an extending cap (12) in an inclined position in relation to a horizontal plane with at least a portion of said cap (12) extending outside the chute (18),
 a cap feeder (24) comprising at least one carrier (22) extending from an upper surface (28) of said cap feeder (24),
 a drive mechanism (30) supporting cap feeder (24) and arranged to move cap feeder (24) between a first position (A) and a second position (B) catching said extending cap (12) on one carrier (22), to move cap feeder (24) further to a third position (C) above a conveyor (26) arranged to move in a horizontal plane in a travel direction (T) while supporting containers (16), and back to said first position (A),
 at least one gripper or cap holder (32) arranged to lift said at least one cap (12) from said cap feeder (24) in position (C) and to attach said at
- least one cap (12) on a container (16).
7. A cap feeding device (10) as claimed in claim 6, wherein said chute (18) extends in an inclined position in relation to a horizontal plane.
8. A cap feeding device (10) as claimed in claim 6, wherein said chute (18) is provided with a cap dispenser (20) at a bottom most section.
9. A cap feeding device (10) as claimed in claim 6, wherein cap feeder (24) is provided with an inclined section (25) at one end, wherein said inclined section (25) is in front when cap feeder (24) moves in directions parallel to transport direction (T).
10. A cap feeding device (10) as claimed in claim 6, comprising
- a first linear motor (34) operating on a fixed first bar (36) along a line in parallel with transport direction (T),
 a second linear motor (38) fixedly connected to said first linear motor (34) and driving a second bar (40) in a direction perpendicular to transport direction (T), wherein cap feeder (24) is connected to second bar (40) to be moved together with second bar (40).
11. A cap feeding device (10) as claimed in claim 10, wherein first linear motor (34) supports at least one bushing block (48) slidably supporting a support rod (46) for movement in parallel with second bar (40), and wherein support rod (46) is connected to cap feeder (24).

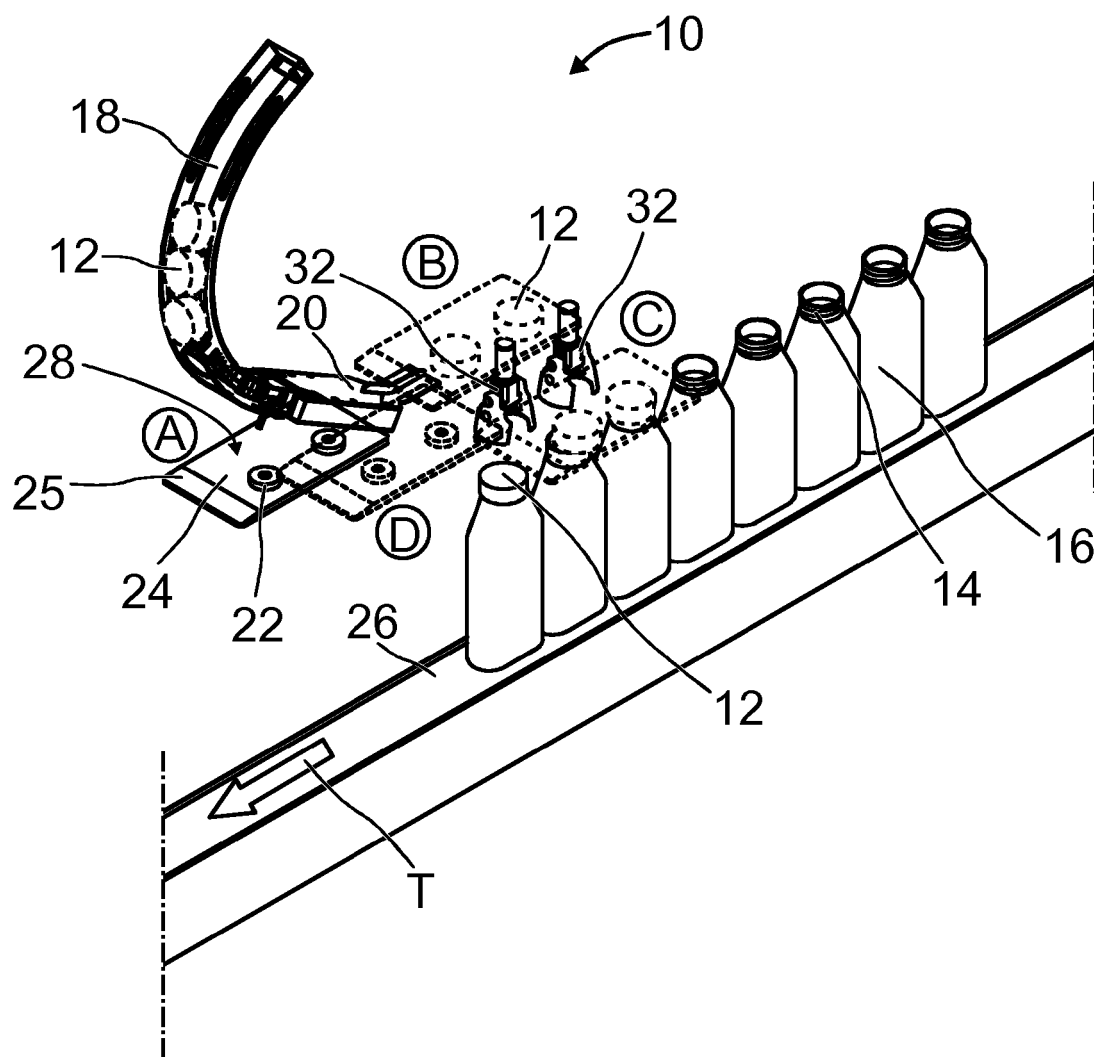


Fig. 1

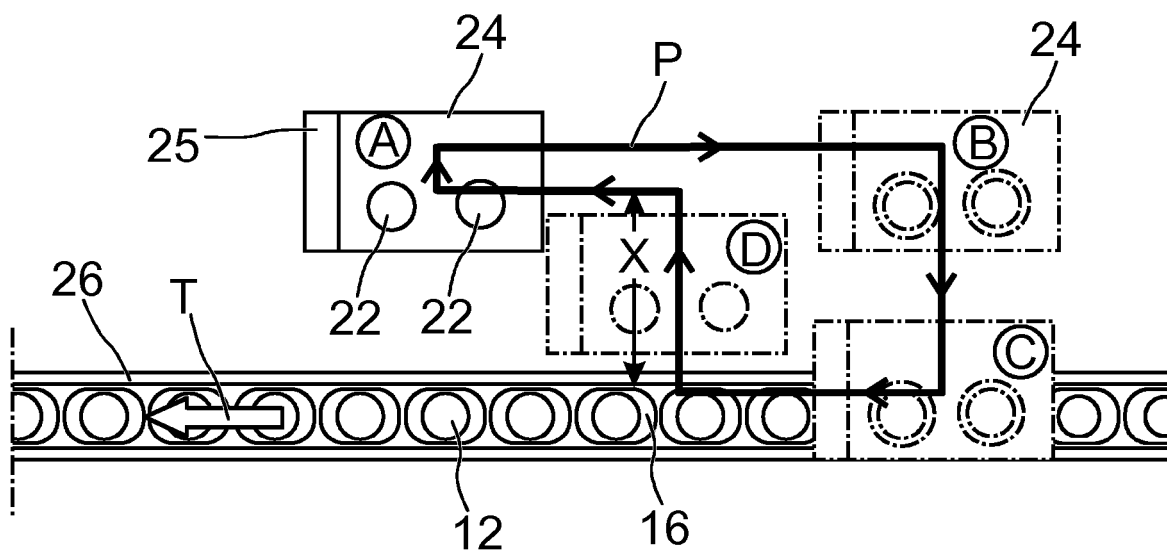
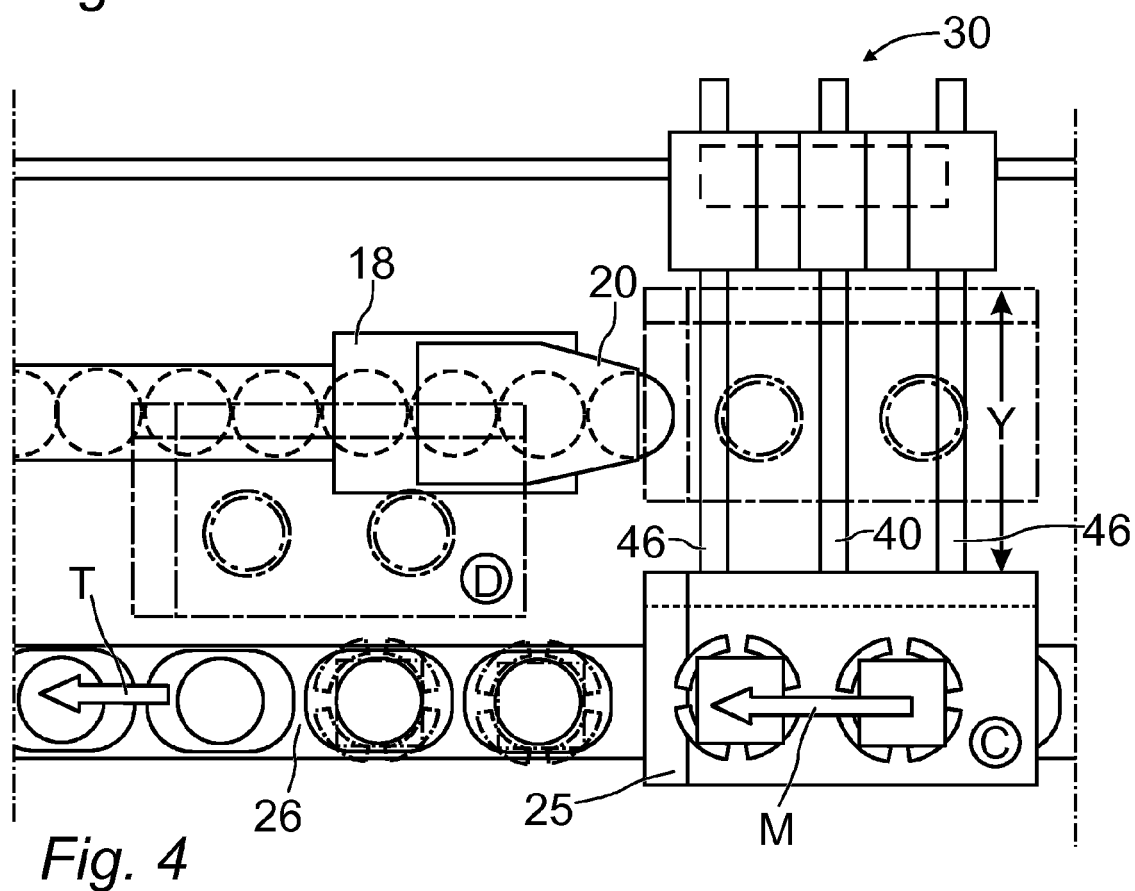
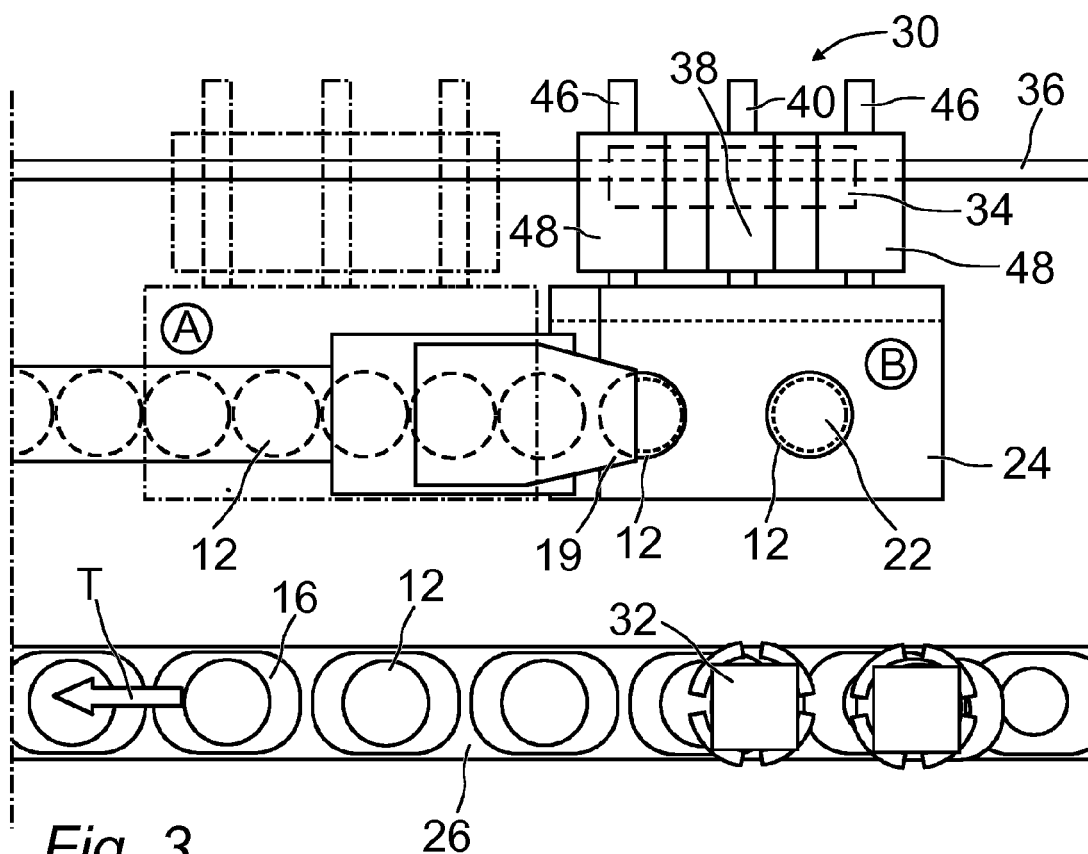


Fig. 2



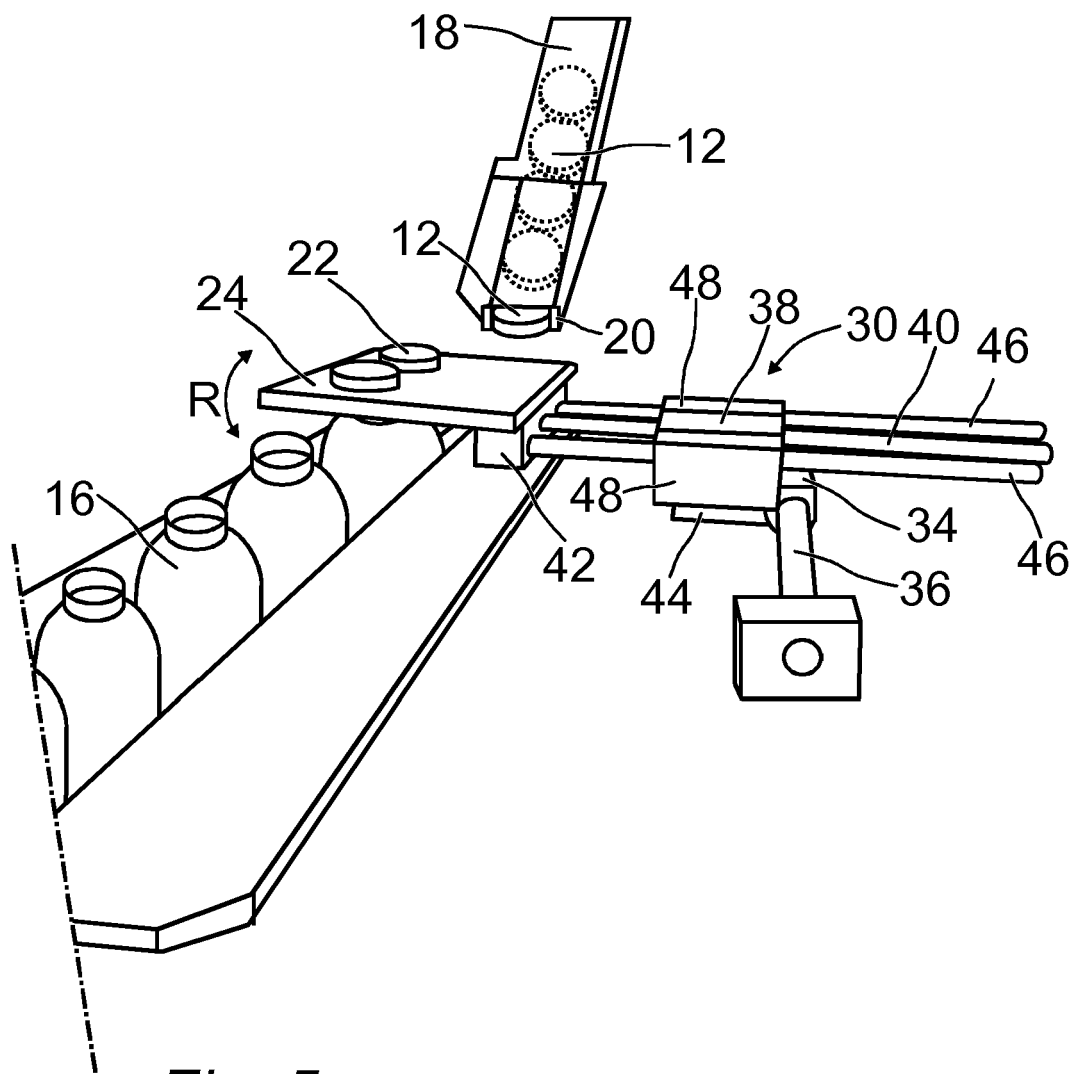


Fig. 5

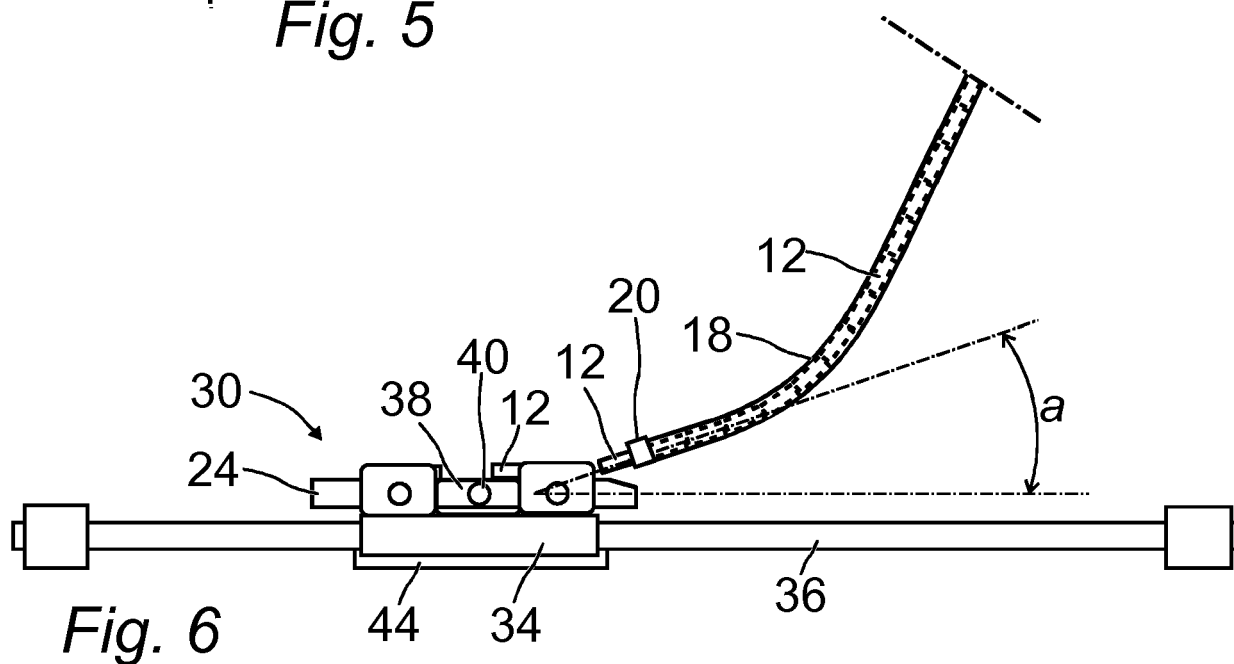


Fig. 6



EUROPEAN SEARCH REPORT

Application Number
EP 17 19 9215

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 295 840 A2 (SEIKO CORP [JP]) 26 March 2003 (2003-03-26) * figures 1-9C * * paragraphs [0015] - [0038], [0047] - [0069] *	1-11	INV. B67B3/06 B67B3/20
X	GB 2 280 428 A (BOSCH GMBH ROBERT [DE]) 1 February 1995 (1995-02-01) * figures 1,2 * * page 3, line 1 - page 7, line 6 *	1-4,6-9	
X	EP 0 745 555 A1 (SEIKO CO LTD [JP]) 4 December 1996 (1996-12-04) * figures 1-4d * * column 3, line 48 - column 6, line 59 *	1-4,6-9	
X	FR 2 606 006 A1 (CGA HBS [FR]) 6 May 1988 (1988-05-06) * figures 1-7 * * page 3, line 27 - page 8, line 34 *	1-9	
X	EP 0 562 810 A1 (SHIBUYA KOGYO CO LTD [JP]; KAO CORP [JP]) 29 September 1993 (1993-09-29) * figures 34-40 * * column 24, line 5 - column 30, line 14 *	1-4,6-9	TECHNICAL FIELDS SEARCHED (IPC) B67B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 April 2018	Examiner Pardo Torre, Ignacio
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 19 9215

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 1295840 A2	26-03-2003	DE 60205552 D1 DE 60205552 T2 EP 1295840 A2 JP 2003095384 A	22-09-2005 30-03-2006 26-03-2003 03-04-2003
GB 2280428 A	01-02-1995	CH 687524 A5 DE 4325843 A1 GB 2280428 A IT MI941612 A1	31-12-1996 02-02-1995 01-02-1995 31-01-1995
EP 0745555 A1	04-12-1996	DE 69508064 D1 DE 69508064 T2 EP 0745555 A1 ES 2129157 T3 JP 3507584 B2 JP H08324688 A	08-04-1999 11-11-1999 04-12-1996 01-06-1999 15-03-2004 10-12-1996
FR 2606006 A1	06-05-1988	NONE	
EP 0562810 A1	29-09-1993	DE 69301117 D1 DE 69301117 T2 EP 0562810 A1 US 5339600 A	08-02-1996 17-10-1996 29-09-1993 23-08-1994