(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 458 698 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.11.2024 Bulletin 2024/45

(21) Application number: **24160230.9**

(22) Date of filing: **28.02.2024**

(51) International Patent Classification (IPC):
B65B 19/34 *(2006.01)* ***B31D 5/00*** *(2017.01)*

(52) Cooperative Patent Classification (CPC):
B65B 19/34; B31D 5/0095; B31F 1/0032; B65B 35/56; B65B 63/04; B65B 9/045; B65B 2009/047

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(30) Priority: **01.03.2023 IT 202300003678**

(71) Applicant: **G.D S.p.A.**
40133 Bologna (IT)

(72) Inventors:
- **FAZZIOLI, Fabrizio**
  40133 Bologna (IT)
- **FORTINI, Massimo**
  40133 Bologna (IT)

(74) Representative: **Studio Torta S.p.A.**
Via Viotti, 9
10121 Torino (IT)

(54) **WRAPPING METHOD AND PACKER MACHINE FOR STRAWS, WITH ORIENTATION BEFORE THE PACKING**

(57) A wrapping method and a packer machine (6) for straws (1). The wrapping method comprises: moving, by means of a bending conveyor (13), two seats (15), which are arranged beside one another; inserting, in a first transfer station (S3), two straight straws (1) into the two seats (15); bending, by means of at least one bending element (16), an outer portion of each straw (1) carried by a respective seat (15) by 180° relative to the rest of the straw (1); rotating, by means of an orientation system (27), each bent straw (1) relative to the bending conveyor (13) in order to also insert the outer portion of the bent straw (1) into the corresponding seat (15) so that a first bent straw (1) is rotated in a first direction and a second bent straw (1) is rotated in a second direction contrary to the first direction; and retrieving, in a second transfer station (S4), the two bent straws (1) from the two seats (15).

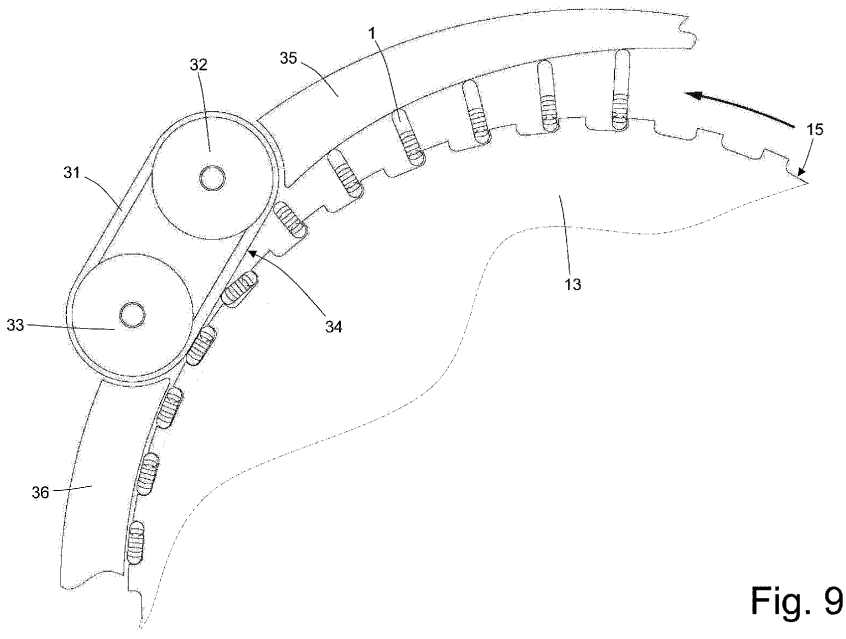


Fig. 9

EP 4 458 698 A1

Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102023000003678 filed on March 1st, 2023, the entire disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to a wrapping method and a packer machine for straws.

PRIOR ART

[0003] Straws having an intermediate corrugated portion designed to allow the straw to be bent so that, in use, it takes the shape most suitable for the user are well known.

[0004] For some applications, a straw is individually packaged (i.e., it is inserted individually into its own wrapping) after being bent into a "U" shape (i.e., by 180°) at the intermediate corrugated portion (the purpose of the bending into a "U" shape is to reduce the overall size of the straw); U-bent straws are typically required to be packaged individually when the straws are to be attached (glued) to the back wall of a beverage container.

[0005] A packer machine known to package straws individually includes: a hopper containing a mass of straws, a drawing drum which takes the straws from the hopper, a bending drum which bends each straw, and a wrapping drum which has a plurality of suction seats, each designed to house a portion of a first continuous (i.e., seamless) band of wrapping material, and a straw. Each suction seat of the wrapping drum receives a portion of the first continuous band of wrapping material which is bent into a "U" shape inside the suction seat to define a pocket and then receives, directly from the bending drum, a straw (which places itself inside the pocket). The wrapping drum is coupled to an applicator drum which applies (typically by heat-sealing) to the first continuous band of wrapping material a second continuous band of wrapping material which closes the pockets containing the straws. Therefore, a continuous (i.e., seamless) succession of pockets, each containing a straw, is fed from the wrapping drum; this continuous succession of pockets, each containing a straw, in jargon is called a *"cartridge belt"*.

[0006] In order to increase (indeed double) the hourly productivity of the packer machine, it is known to manufacture a dual-line packer machine so that all operations are performed simultaneously on two straws placed side by side. In particular, a double straw (i.e., of double length) is taken from the hopper and, immediately after the withdrawal, is cut in half to form two independent (of single length) and side-by-side straws which are then subjected to operations of corrugation (if applicable), U-bending, and wrapping, so as to form two side-by-side *"cartridge belts"*. However, the two *"cartridge belts"* are not perfectly identical, as they have, relative to one another, a mirror-like symmetry of the straws or of the sheets of wrapping, which complicates the subsequent processing steps, since an automatic machine (for example, a filling machine for the production of single-dose beverage parallelepiped packages) using straws must be adaptable (i.e., flexible) to be able to operate with two different "*cartridge belts*".

[0007] Patent application WO2021250715A1 discloses a straw packer machine comprising a feeding unit configured to feed a plurality of paper straws to several processing units configured to automatically perform different processes on the straws, including a deformation to make a bellows, a cut, following the deformation, to obtain an obliquely cut pointed end, a bend at the bellows, and a packaging of each straw.

DESCRIPTION OF THE INVENTION

[0008] The object of the present invention is to provide a wrapping method and a packer machine for straws which allow, by operating on a dual line, to produce two perfectly identical "*cartridge belts*".

[0009] In accordance with the present invention, a wrapping method and a packer machine for straws are provided as established in the attached claims.

[0010] The claims describe preferred embodiments of the present invention forming an integral part of the present specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will now be described with reference to the accompanying drawings, which illustrate some non-limiting embodiments thereof, in which:

- Figure 1 is a perspective view of a straw applied to a beverage package;
- Figure 2 is an enlarged-scale view of the straw in Figure 1;
- Figure 3 is a schematic front view of a packer machine which bends and wraps the straw in Figure 1;
- Figures 4, 5 and 6 are three different enlarged-scale views of respective details of a bending drum of the packer machine in Figure 3;
- Figure 7 is a side view of a first orienting device of the bending drum in Figure 3;
- Figure 8 is an enlarged-scale view of a detail of the first orienting device in Figure 7;
- Figure 9 is a side view of a second orienting device of the bending drum in Figure 3; and
- Figure 10 is an enlarged-scale view of a detail of the second orienting device in Figure 9.

PREFERRED EMBODIMENTS OF THE INVENTION

[0012] In Figure 1, the numeral 1 indicates, as a whole, a straw (made of paper or plastic) which is applied to the back of a beverage package. The straw 1 has a flat end 2 (which is grasped by the user's lips) and a pointed end 3 (to more effectively break through the cap sealing a dispensing opening of the package).

[0013] In addition, the straw 1 has an intermediate corrugated portion 4 at which the straw 1 can be bent easily and without breakage (i.e., elastically) to take, in use, the shape most suitable for the user.

[0014] The straw 1 is individually packaged (i.e., it has been inserted individually into its own wrapping 5, not shown in Figure 1 and shown in Figure 2) after being bent into a "U" shape (i.e., by 180°) at the intermediate corrugated portion 4 (the purpose of the bending into a "U" shape is to reduce the overall size of the straw 1 so that it remains within the dimensions of the back wall of the package to which the straw 1 is applied).

[0015] In Figure 3, the numeral 6 indicates, as a whole, a packer machine, which receives the straight straws 1 from a manufacturing machine (not shown), corrugates the straws 1, bends the straws 1 into a "U" shape, and inserts the bent straws 1 into corresponding wrappings 5.

[0016] The packer machine 6 comprises a hopper 7, which is suitable for containing a mass of straight straws 1 coming from the manufacturing machine and moving progressively by gravity downwards, that is to say to the bottom of the hopper 7. As an alternative to the hopper 7, the packer machine 6 could have any buffer or collector for a mass of straws.

[0017] As a further alternative, the packer machine 6 could receive the straws in an orderly manner (i.e., not collected in a mass), for example directly from the manufacturing machine.

[0018] At the bottom of the hopper 7 there is a retrieval conveyor 8 which, in an input station S1, retrieves a succession of straight straws 1 and moves them transversely (i.e., perpendicular to a longitudinal axis of the straws 1). According to a preferred embodiment shown in the attached figures, the retrieval conveyor 8 consists of a drum, which is mounted so that it can rotate around a rotation axis 9 (horizontal and perpendicular to the plane in Figure 3) and has a plurality of suction seats, each designed to house a corresponding straight straw 1. According to a different embodiment, not shown, the retrieval conveyor 8 is a conveyor belt, i.e., it comprises a flexible belt, which is closed like a ring around two end pulleys and supports a plurality of suction seats, each designed to house a corresponding straight straw 1.

[0019] The packer machine 6 comprises a corrugator drum 10, which is mounted so that it can rotate around a rotation axis 11 (parallel to the rotation axis 9), has a plurality of seats, each designed to house a corresponding straight straw 1, and receives the straight straws 1 directly from the retrieval conveyor 8 in a transfer station S2. Along the periphery of the corrugator drum 10 there is a corrugator device 12, which corrugates the straight straws 1, i.e., it creates the intermediate corrugated portion 4 in each straight straw 1.

[0020] In accordance with one embodiment, not shown, the packer machine 6 could receive straight straws 1 that are already corrugated; in this case, the packer machine 6 does not include the corrugator drum 10.

[0021] The packer machine 6 comprises a bending drum 13, which is mounted so that it can rotate around a rotation axis 14 (parallel to the rotation axis 11), has a plurality of suction seats 15 (shown more clearly in Figures 4-9), each designed to house a corresponding initially straight straw 1, and receives the straight straws 1 directly from the corrugator drum 10 in a transfer station S3. Bending elements 16 are arranged in a fixed position (i.e., integral with a frame of the packer machine 6 and therefore unmovable) around the rotation axis 14, the former being coupled to the bending drum 13 and interacting with the straws 1 carried by the suction seats to bend the straws 1 into a "U" shape.

[0022] The packer machine 6 comprises a waste drum 17, which is mounted so that it can rotate around a rotation axis 18 (parallel to the rotation axis 14), has a plurality of seats, each designed to house a corresponding U-bent straw 1, receives the straws 1 directly from the bending drum 13 in a transfer station S4, and delivers the bent straws 1 in a transfer station S5 arranged downstream of the transfer station S4 in relation to the rotational direction of the waste drum 17.

[0023] The packer machine 6 comprises a wrapping drum 19, which is mounted so that it can rotate around a rotation axis 20 (parallel to the rotation axis 18), has a plurality of suction seats, each designed to house a portion of a continuous (i.e., seamless) band 21 of wrapping material, and a U-bent straw 1. Each suction seat of the wrapping drum 19 receives, in a feeding station S6, a portion of the continuous band 21 of wrapping material which is bent into a "U" shape inside the suction seat to define a pocket and then receives, directly from the waste drum 17 in the transfer station S5, a bent straw 1 (which places itself inside the pocket previously formed in the suction seat). The wrapping drum 22 is coupled to an applicator drum 22, which is mounted so that it can rotate around a rotation axis 23 (parallel to the rotation axis 20) and applies (typically by heat-sealing) to the continuous band 21 of wrapping material and in a feeding station S7 a continuous band 24 of wrapping material which closes the pockets containing the bent straws 1. Therefore, a continuous (i.e., seamless) succession of pockets, each containing a bent straw 1, is fed from the wrapping drum 22; this continuous succession of pockets, each containing a bent straw 1, in jargon is called a "*cartridge belt*".

[0024] The packer machine 6 comprises an output conveyor 25, which receives the "*cartridge belt*" (that is, it receives a continuous band of wrappings 5 containing respective bent straws 1) from the wrapping drum 19 and moves the "*cartridge belt*" to an output of the packer ma-

chine 6.

[0025] Preferably, the whole packer machine 6 operates with a law of continuous motion, that is, with movements at a normally constant speed (when the productivity of the packer machine 6 is stable or in steady, and therefore non-transient, state).

[0026] The packer machine 6 operates on a dual line, that is to say it processes two straws 1 at a time, arranged head first, side by side (that is, axially aligned with each other). In other words, the retrieval conveyor 8 has a set of pairs of suction seats (axially aligned with each other) to retrieve two straight straws 1 at a time from the output mouth of the hopper 7, the corrugator drum 10 has a set of pairs of seats (axially aligned with each other), which simultaneously receive two straight straws 1 from the retrieval conveyor 8, simultaneously corrugate two straws 1 together with the corrugator device 12, and simultaneously deliver two straight straws 1 to the bending drum 13. In turn, the bending drum 13 has a set of pairs of suction seats 15 (axially aligned with each other or side-by-side and aligned along a direction perpendicular to a moving direction of the bending drum 13), which simultaneously receive two straight straws 1 from the corrugator drum 10, simultaneously bend two straws 1, and simultaneously deliver two bent straws 1 to the waste drum 17. In turn, the waste drum 17 has a set of pairs of seats (axially aligned with each other), which simultaneously receive two bent straws 1 from the bending drum 13 and simultaneously deliver two bent straws 1 to the wrapping drum 19. In turn, the wrapping drum 19 has a set of pairs of suction seats (axially aligned with each other), which simultaneously receive two bent straws 1 from the waste drum 17, simultaneously create two wrappings 5 (operating with two continuous bands 21 and 24 of double-width wrapping material), and simultaneously deliver two wrappings 5 to the output conveyor 25. In turn, the output conveyor 25 has a set of pairs of suction seats (axially aligned with each other), which simultaneously receive two wrappings 5 (and thus two "*cartridge belts*") from the wrapping drum 19.

[0027] According to a preferred, non-limiting embodiment, the hopper 7 contains straight straws 1 of double length (i.e., twice the length of a straw 1 coming out of the packer machine 6), which are cut in half by a cutting device 26 coupled to the retrieval conveyor 8.

[0028] As shown in Figures 4, 5 and 6, the bending drum 14 has two sets of seats 15 arranged side by side: one set of seats 15 is arranged on the right-hand side and the other set of seats 15 is arranged on the left-hand side. That is, the bending drum 13 is provided with a plurality of pairs of seats 15 that are side-by-side and aligned axially (i.e., perpendicular to the moving direction of the bending drum 13). In the transfer station S3, each seat 15 contains a respective straw 1 which is still completely straight (as shown in Figure 4). Between the transfer station S3 and the transfer station S4, each seat 15 contains a respective straw, which has been bent by 180° by respective bending elements 16 and still has the bent portion (i.e., the "*short*" portion) protruding radially cantilevered (as shown in Figure 5). In the transfer station S4, each seat 15 contains a respective straw 1, which has been bent by 180° by a bending element 16 and then rotated by 90° by an orientation system 27 (shown in Figures 7-10) to also arrange the bent portion (i.e., the "*short*" portion) inside the seat 15.

[0029] As shown in Figure 6, the orientation system 27 rotates by 90° the straws 1 of one set of seats 15 in one direction and rotates by 90° the straws 1 of the other set of seats 15 in an opposite direction; that is, if the straws 1 of one set of seats 15 are rotated by 90° clockwise, then the straws 1 of the other set of seats 15 are rotated by 90° anticlockwise. In this way, the straws 1 located in the set of seats 15 on the right have an orientation symmetrically opposite to the straws 1 located in the set of seats 15 on the left. This seeming unevenness, instead, makes it possible to form two "*cartridge belts*" that are perfectly identical, that is to say, completely indistinguishable from one another.

[0030] As shown in Figures 7-10, the orientation system 27 comprises two different orienting devices 28 and 29, each arranged on a respective side of the bending drum 13 and operating with a respective set of seats 15; that is, the orienting device 28 is arranged on the left side of the bending drum 13 and operates with the set of seats 15 on the left side, and the orienting device 29 is arranged on the right side of the bending drum 13 and operates with the set of seats 15 on the right side. The orienting devices 28 and 29 are configured to rotate the respective straws 1 in opposite directions.

[0031] As shown in Figures 7 and 8, the orienting device 28 is completely passive (i.e., it has no moving parts) and comprises a fixed orienting element 30 (i.e., which is rigidly fixed to a frame of the packer machine 6 and does not rotate with the bending drum 13), which has an arc-of-a-circle shape, is arranged around part of the periphery of the bending drum 13, and has a variable distance from the bending drum 13 (in particular a distance decreasing along the rotational direction of the bending drum 13), so as to progressively force a bent straw 1, located in a respective seat 15, to completely enter the seat 15 by rotating by 90° in a direction contrary to the rotational direction of the bending drum 13. In other words, the orienting device 28 rotates the bent straws 1 by 90° in a direction contrary to the rotational direction of the bending drum 13, and this type of rotation can be obtained by using the movement of the bending drum 13 by making the straws 13 enter in contact with a "*fixed obstacle*" (the orienting element 30).

[0032] According to a possible embodiment, the orienting element 30 can be integrated, i.e., form a single, seamless body, with a respective bending element 16.

[0033] As shown in Figures 9 and 10, the orienting device 29 is partially active (i.e., it has moving parts) and comprises an orienting belt 31, which is closed like a ring around two pulleys 32 and 33, is arranged near the periphery of the bending drum 13, and has an active branch

34 facing the periphery of the bending drum 13. The active branch 34 of the orienting belt 31 has a variable distance from the bending drum 13 (in particular a distance decreasing along the rotational direction of the bending drum 13) and, in use, moves in the same rotational direction as the bending drum 13 at a higher speed than the peripheral speed of the seats 15 of the bending drum 13, so as to progressively force a bent straw 1, located in a respective seat 15, to completely enter the seat 15 by rotating by 90° in the same rotational direction as the bending drum 13. In other words, the orienting device 29 rotates the bent straws by 90° in the same rotational direction as the bending drum 13, and this type of rotation can only be achieved by "*accelerating*" the bent straws 1 (through the active branch 33 of the orienting belt 31) relative to the rotation of the bending drum 13.

[0034] According to a preferred embodiment, the pulley 32 is idle whereas the pulley 33 is motorized and receives the motion from the same motor such that it causes the rotation of the bending drum 13, so that the moving speed of the orienting belt 31 always corresponds to the peripheral speed of the seats 15 of the bending drum 13, to prevent both rotating the bent straws 1 by less than 90° (if the moving speed of the orienting belt 31 is too slow) and rotating the bent straws 1 too fast, subjecting the bent straws 1 to excessive mechanical stress 1 (if the moving speed of the orienting belt 31 is too fast).

[0035] According to a preferred embodiment, the two pulleys 32 and 33 of the orienting device 29 are arranged at different distances from the periphery of the bending drum 13 so as to allow the orienting belt 31 to gain a variable distance from the bending drum 13 (in particular a distance decreasing along the rotational direction of the bending drum 13); in particular, the pulley 32 arranged upstream relative to the rotational direction of the bending drum 13 is farther from the periphery of the bending drum 13, whereas the pulley 33 arranged downstream relative to the rotational direction of the bending drum 13 is closer to the periphery of the bending drum 13.

[0036] According to a preferred embodiment, the orienting device 29 also comprises a fixed accompanying element 35 (i.e., which is rigidly fixed to a frame of the packer machine 6 and does not rotate with the bending drum 13), which has an arc-of-a-circle shape, is arranged around part of the periphery of the bending drum 13, and is arranged upstream of the orienting belt 31 relative to the rotational direction of the bending drum 13 to contain the straws 1 inside the seats 15 before the action of the orienting belt 31. Similarly, according to a preferred embodiment, the orienting device 29 also comprises a fixed accompanying element 36 (i.e., which is rigidly fixed to a frame of the packer machine 6 and does not rotate with the bending drum 13), which has an arc-of-a-circle shape, is arranged around part of the periphery of the bending drum 13, and is arranged downstream of the orienting belt 31 relative to the rotational direction of the bending drum 13 to contain the straws 1 inside the seats 15 after the action of the orienting belt 31.

[0037] According to a possible embodiment, the accompanying element 35 can be integrated, i.e., form a single, seamless body, with a respective bending element 16.

[0038] The orienting device 29 comprises an orienting conveyor having the active branch 34 which has a variable distance from the bending drum 13 and, in use, moves in the same direction as the moving direction of the bending drum 13 at a higher speed than a speed of the seats 15. In the embodiment shown in the attached figures, the orienting conveyor comprises the orienting belt 31, which is closed like a ring around the two pulleys 32 and 33 and has the active branch 34; according to a different embodiment, not shown, the orienting conveyor comprises a cylindrical roller (or a succession of cylindrical rollers) having the active branch 34.

[0039] The embodiments described herein may be combined with each other without departing from the scope of protection of the present invention.

[0040] The packer machine 6 described above has many advantages.

[0041] Firstly, the packer machine 6 described above makes it possible to form two "*cartridge belts*" that are perfectly identical, that is to say, completely indistinguishable from one another, and this simplifies the subsequent processing steps, since an automatic machine (for example, a filling machine for the production of single-dose beverage parallelepiped packages) using the straws 1 can operate with only one type of "*cartridge belt*".

[0042] In addition, the changes made to the packer machine 6 described above have no negative impact on productivity and quality as they do not introduce new operations on the straws 1 but merely reverse the rotational direction of a part of the bent straws 1 immediately after the 180° bending operation.

[0043] Lastly, the packer machine 6 described above requires minimal changes compared to an existing packer machine and is therefore simple, inexpensive and compact to manufacture.

LIST OF REFERENCE NUMBERS IN THE FIGURES

[0044]

1	straw
2	flat end
3	pointed end
4	intermediate portion
5	wrapping
6	packer machine
7	hopper
8	retrieval conveyor
9	rotation axis
10	corrugator drum
11	rotation axis
12	corrugator device
13	bending drum

14 rotation axis
15 seats
16 bending elements
17 waste drum
18 rotation axis
19 wrapping drum
20 rotation axis
21 continuous band of wrapping material
22 applicator drum
23 rotation axis
24 continuous band of wrapping material
25 output conveyor
26 cutting device
27 orientation system
28 orienting device
29 orienting device
30 orienting element
31 orienting belt
32 idler pulley
33 motorized pulley
34 active branch
35 accompanying element
36 accompanying element
S1 input station
S2 transfer station
S3 transfer station
S4 transfer station
S5 transfer station
S6 feeding station
S7 feeding station

Claims

1. A wrapping method for straws (1) comprising the steps of:

moving, by means of a bending conveyor (13), two seats (15), which are arranged beside one another;
inserting, in a first transfer station (S3), two straight straws (1) into the two seats (15);
bending, by means of at least one bending element (16), an outer portion of each straw (1) carried by a respective seat (15) by 180° relative to the rest of the straw (1);
rotating, by means of an orientation system (27), each bent straw (1) relative to the bending conveyor (13) in order to also insert the outer portion of the bent straw (1) into the corresponding seat (15); and
retrieving, in a second transfer station (S4), the two bent straws (1) from the two seats (15);
the wrapping method is **characterized in that** a first bent straw (1) is rotated in a first direction and a second bent straw (1) is rotated in a second direction contrary to the first direction.

2. The wrapping method according to claim 1, wherein the first bent straw (1) is rotated by 90° in the first direction and the second bent straw (1) is rotated by 90° in the second direction contrary to the first direction.

3. The wrapping method according to claim 1 or 2, wherein the first direction is the same as a moving direction of the bending conveyor (13) and the second direction is contrary to the moving direction of the conveyor (13).

4. The wrapping method according to claim 1, 2 or 3, wherein the orientation system (27) comprises two different orienting devices (28, 29), each arranged on a respective side of the bending conveyor (13) and operating with a respective seat (15).

5. The wrapping method according to claim 4, wherein the first orienting device (28) comprises a fixed orienting element (30), which has a variable distance from the bending conveyor (13), in particular a distance decreasing along a moving direction of the bending conveyor (13), so as to progressively force the first straw (1) to completely enter the first seat (15) by rotating in the first direction contrary to the moving direction of the bending conveyor (13).

6. The wrapping method according to claim 4 or 5, wherein the second orienting device (29) comprises an orienting conveyor having an active branch (34), which has a variable distance from the bending conveyor (13), in particular a distance decreasing along a moving direction of the bending conveyor (13), and, in use, moves in a same direction as the moving direction of the bending conveyor (13) and at a higher speed than a speed of the second seat (15), so as to progressively force the second straw (1) to completely enter the second seat (15) by rotating in the second direction contrary to the moving direction of the bending conveyor (13).

7. The wrapping method according to claim 6, wherein the orienting conveyor comprises an orienting belt (31), which is closed like a ring around two pulleys (32, 33) and has the active branch (34), which has a variable distance from the bending conveyor (13) and, in use, moves in a same direction as the moving direction of the bending conveyor (13) and at a higher speed than a speed of the second seat (15), so as to progressively force the second straw (1) to completely enter the second seat (15) by rotating in the second direction contrary to the moving direction of the bending conveyor (13).

8. The wrapping method according to claim 7, wherein a pulley (33) is motorized and receives the motion from the same motor that causes the rotation of the

bending conveyor (13).

9. The wrapping method according to claim 7 or 8, wherein the two pulleys (32, 33) are arranged at different distances from the bending conveyor (13) so as to allow the orienting belt (31) to gain a variable distance from the bending conveyor (13).

10. The wrapping method according to claim 9, wherein a pulley (32) arranged upstream relative to the moving direction of the bending conveyor (13) is farther from the bending conveyor (13), whereas a pulley (33) arranged downstream relative to the moving direction of the bending conveyor (13) is closer to the bending conveyor (13).

11. The wrapping method according to one of the claims from 7 to 10, wherein the bending conveyor (13) comprises:

a first fixed accompanying element (35) upstream of the orienting belt (31) relative to the moving direction of the bending conveyor (13) to contain the second straw (1) inside the second seat (15) before the action of the orienting belt (31); and
a second fixed accompanying element (36) arranged downstream of the orienting belt (31) relative to the moving direction of the bending conveyor (13) to contain the second straw (1) inside the second seat (15) after the action of the orienting belt (31).

12. The wrapping method according to one of the claims from 1 to 11, wherein the bending conveyor (13) rotates around a rotation axis (14).

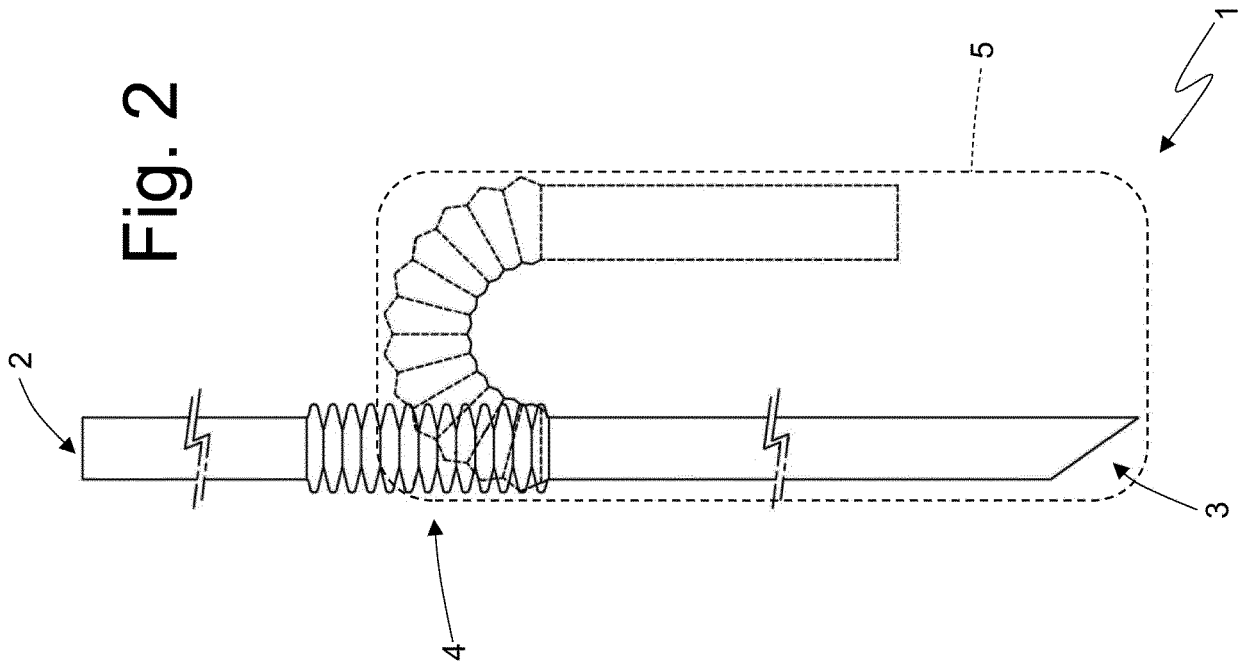
13. The wrapping method according to one of the claims from 1 to 12, wherein the two seats (15) are beside one another and are aligned along a direction perpendicular to a moving direction of the bending conveyor (13).

14. The wrapping method according to one of the claims from 1 to 13 and comprising the further step of creating a wrap (5) around each straw (1).

15. A packer machine (6) for straws (1) comprising:

a bending conveyor (13) configured to move two seats (15) beside one another;
a first transfer station (S3) configured to insert two straight straws (1) into the two seats (15);
at least one bending element (16) configured to bend an outer portion of each straw (1) carried by a respective seat (15) by 180° relative to the rest of the straw;
an orientation system (27) configured to rotate each bent straw (1) relative to the bending conveyor (13) so as to also insert the outer portion of the bent straw (1) into the corresponding seat (15); and
a second transfer station (S4) configured to retrieve the two bent straws (1) from the two seats (15);
the packer machine (6) is **characterized in that** a first bent straw (1) is rotated in a first direction and a second bent straw (1) is rotated in a second direction contrary to the first direction.

Fig. 2



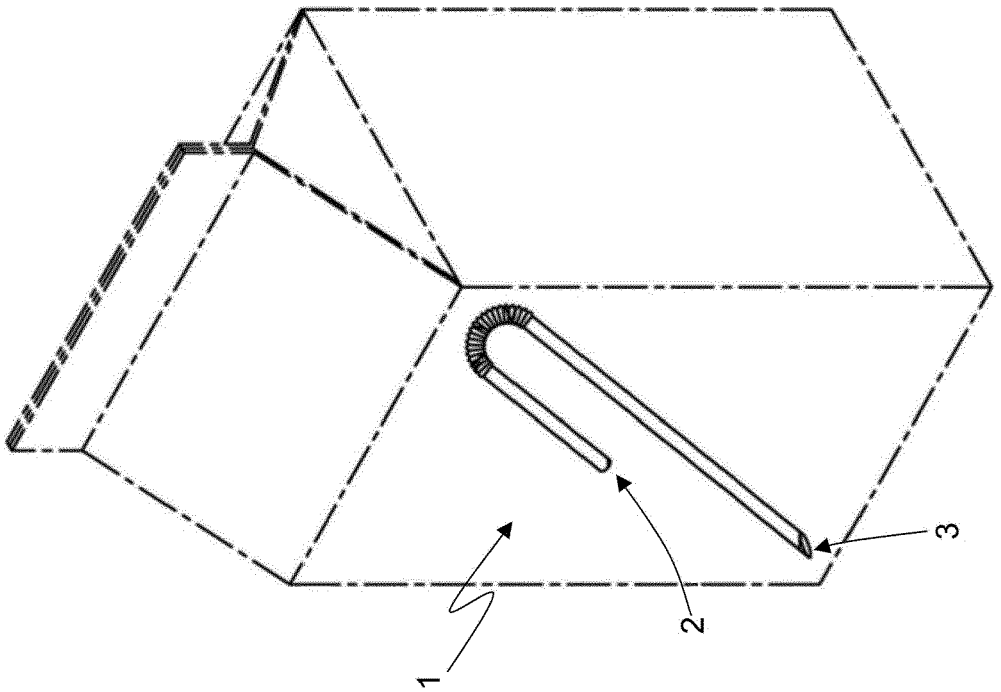


Fig. 1

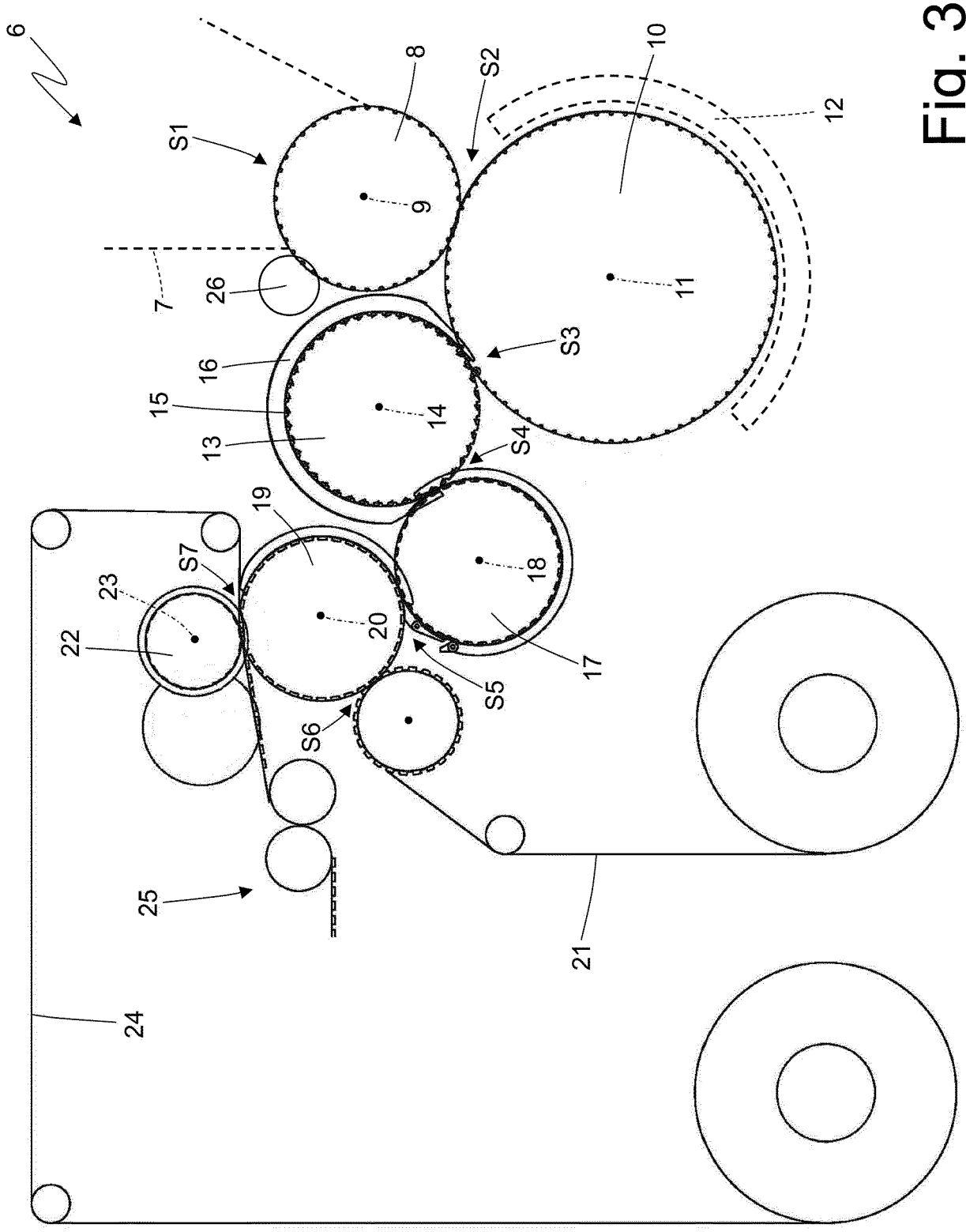

6
8
S2
10
12
S1
9
7
26
11
S3
16
15
14
13
S4
19
18
S7
23
20
22
17
S5
S6
25
21
24

Fig. 3

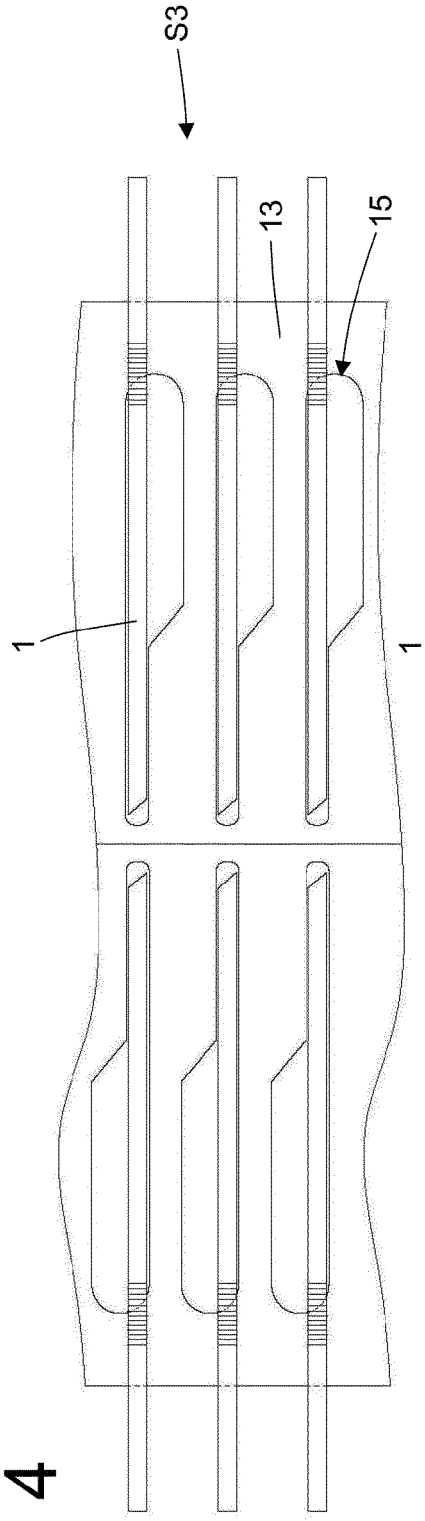


Fig. 4

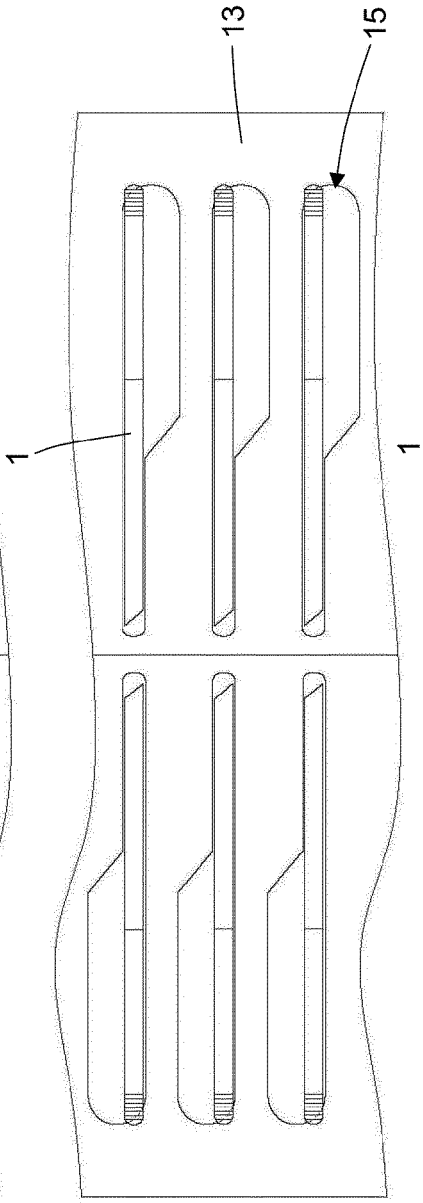


Fig. 5

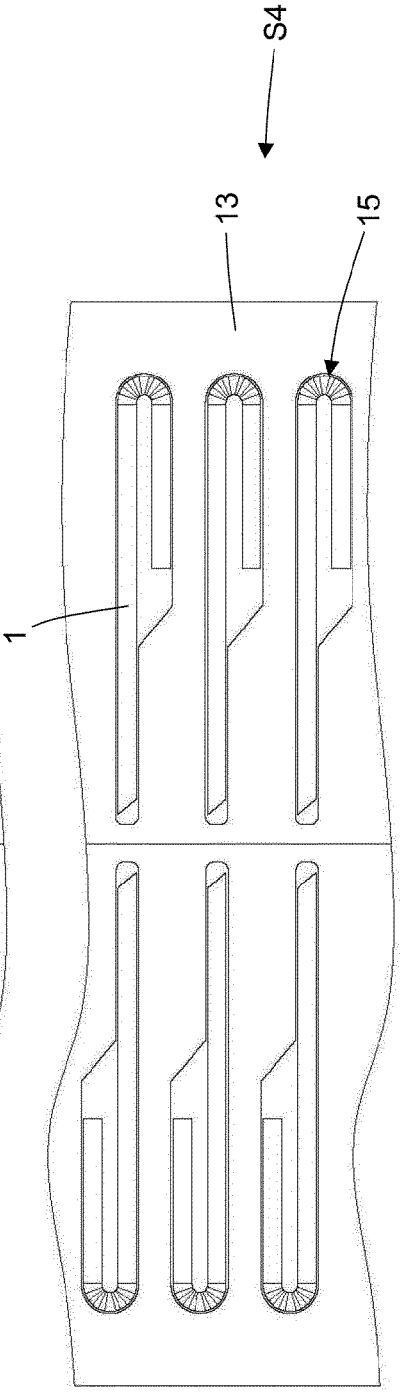


Fig. 6

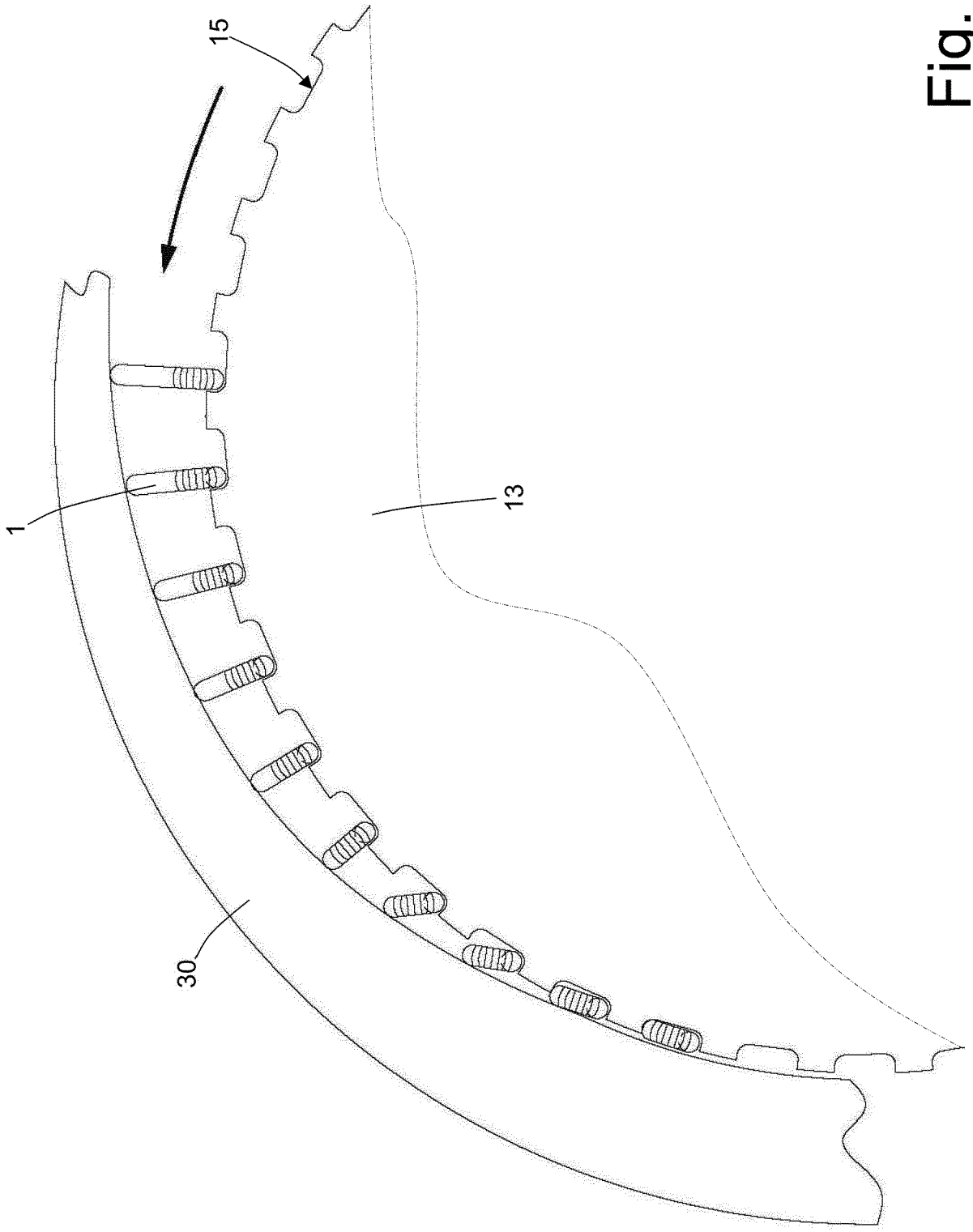
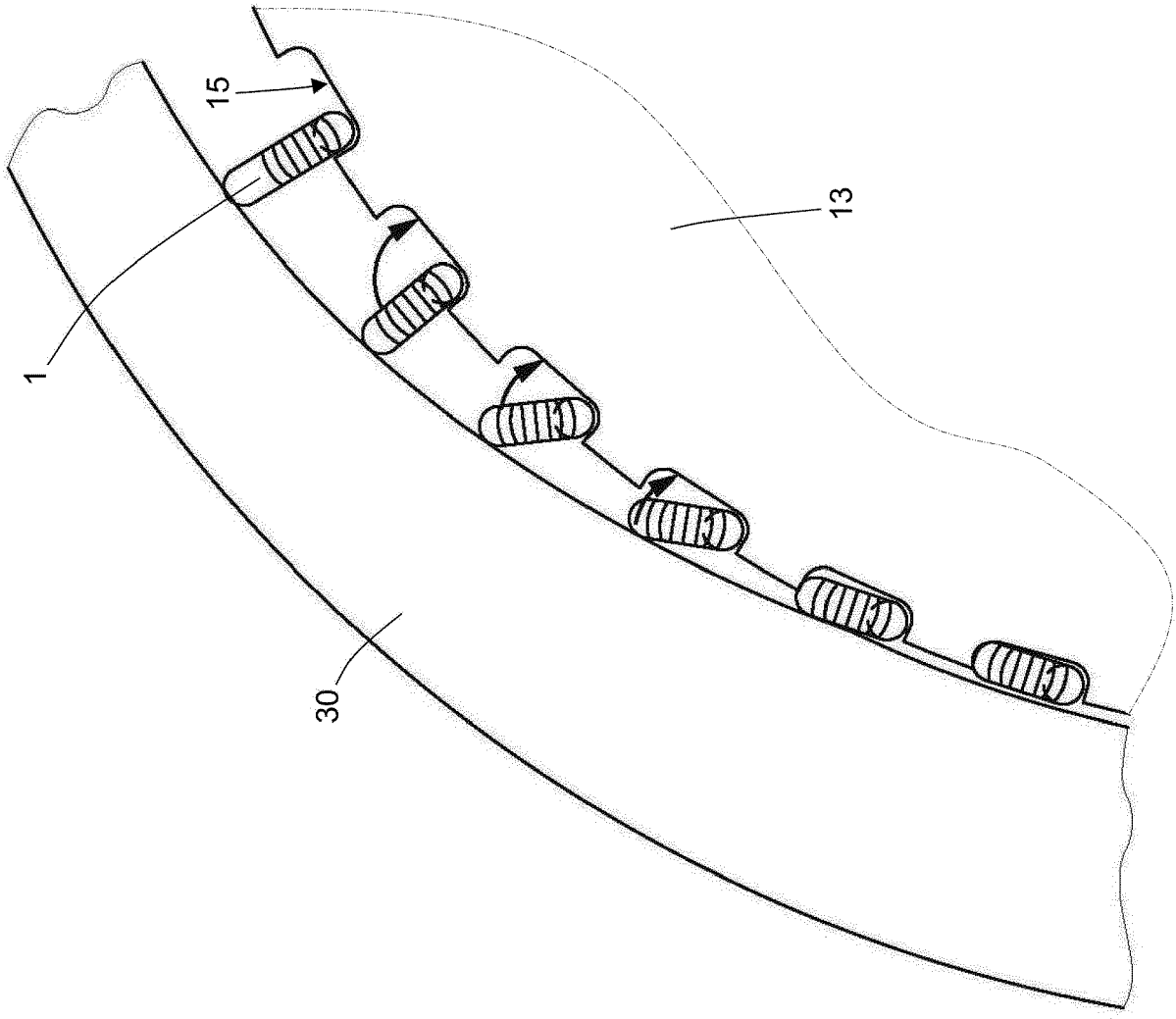


Fig. 7

Fig. 8



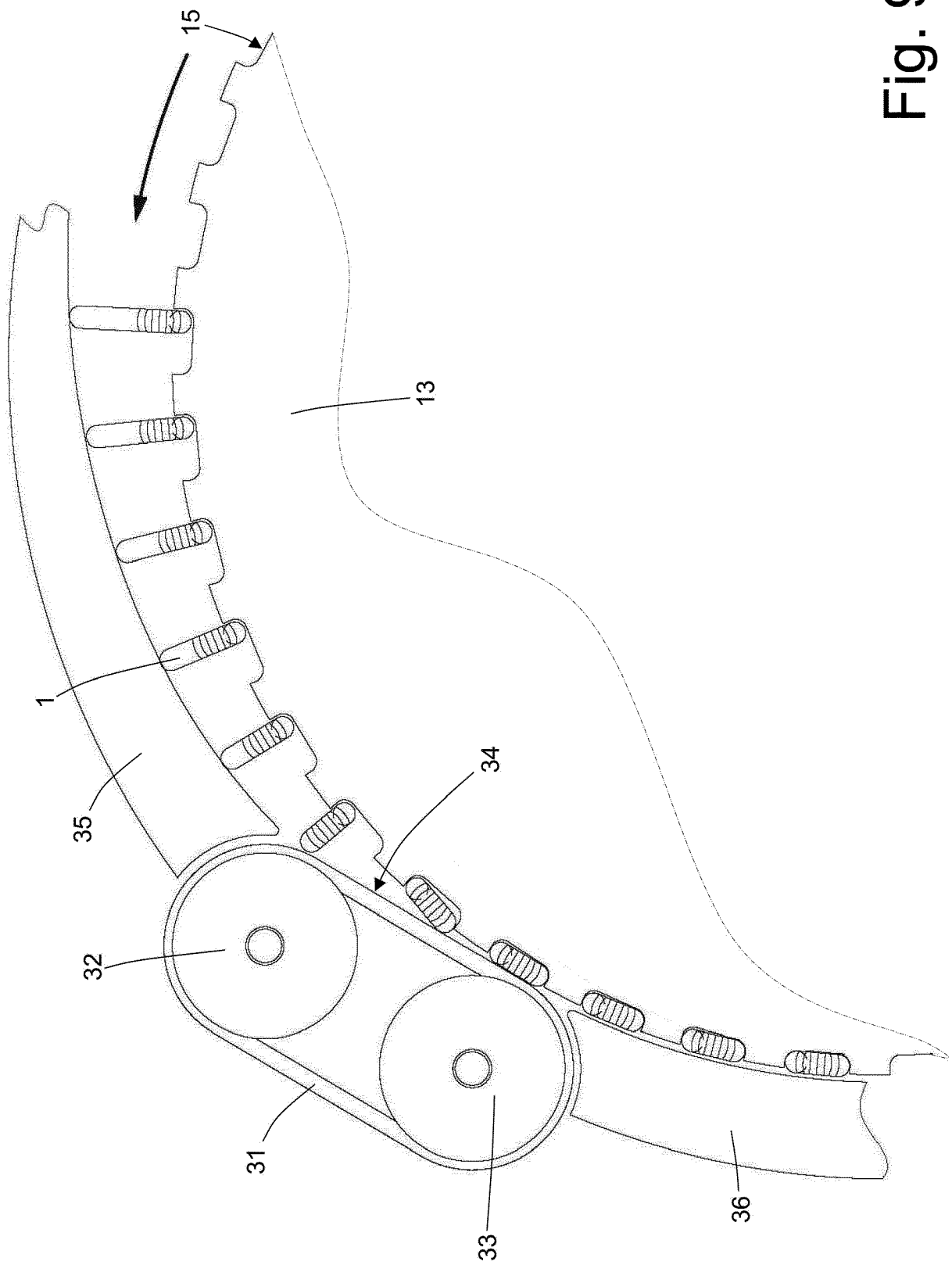
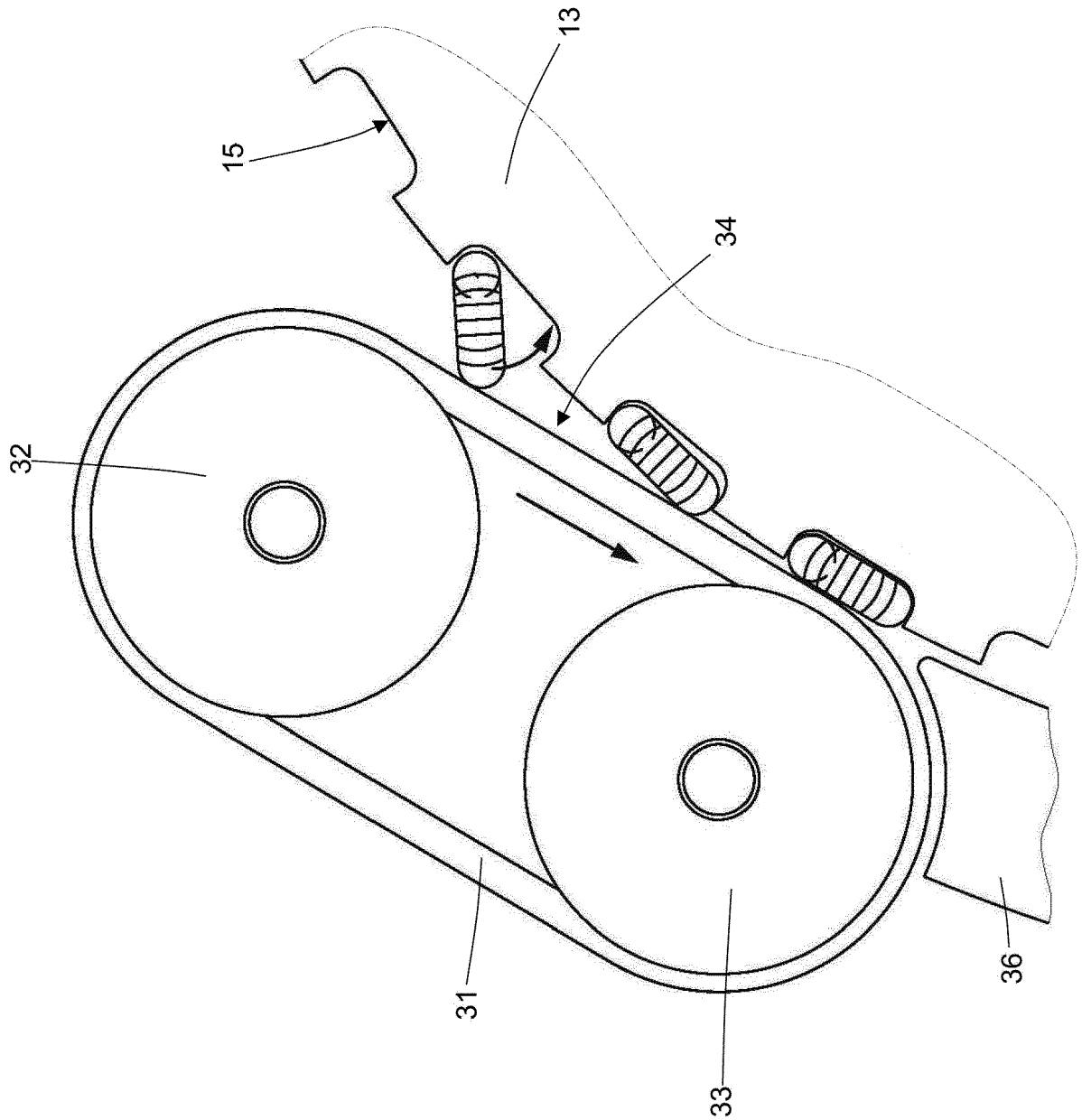


Fig. 9

Fig. 10



Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 24 16 0230

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	WO 2021/250715 A1 (IMA SPA [IT]) 16 December 2021 (2021-12-16) * abstract * * figures 1-8 * * page 15, line 13 * * page 14, line 30 - line 31 * * page 14, line 26 *	1-15	INV. B65B19/34 B31D5/00
A	CN 115 429 086 A (ZHEJIANG JINSHEN MACHINERY MFT CO LTD) 6 December 2022 (2022-12-06) * abstract * * figure 5 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

B65B
B31F
B31D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 September 2024	Damiani, Alberto

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 24 16 0230

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-09-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2021250715 A1	16-12-2021	EP 4164874 A1	19-04-2023
		US 2023256700 A1	17-08-2023
		WO 2021250715 A1	16-12-2021
CN 115429086 A	06-12-2022	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT 102023000003678 **[0001]**
- WO 2021250715 A1 **[0007]**