

(19)



(11)

EP 4 313 576 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
19.03.2025 Bulletin 2025/12

(21) Application number: **22725292.1**

(22) Date of filing: **23.03.2022**

(51) International Patent Classification (IPC):
B31D 5/00 (2017.01) B31F 1/00 (2006.01)

(52) Cooperative Patent Classification (CPC):
B31D 5/0095; B31F 1/008

(86) International application number:
PCT/IB2022/052633

(87) International publication number:
WO 2022/201045 (29.09.2022 Gazette 2022/39)

(54) APPARATUS AND METHOD FOR CORRECTING SHAPE OF STRAW EDGES

VORRICHTUNG UND VERFAHREN ZUR KORREKTUR DER FORM VON STROHKANTEN
APPAREIL ET PROCÉDÉ DE CORRECTION DE LA FORME DE BORDS DE PAILLE

(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

(30) Priority: **24.03.2021 PL 43738621**

(43) Date of publication of application:
07.02.2024 Bulletin 2024/06

(73) Proprietor: **International Tobacco Machinery Poland Sp. z o.o. 26-600 Radom (PL)**

(72) Inventor: **SIKORA, Leszek 26-600 Radom (PL)**

(74) Representative: **Markieta, Jaroslaw Franciszek Kancelaria Rzeczników Patentowych J. Markieta, M. Zielinska-Lazarowicz Sp. p. Bukowinska 2 lok 160 02-703 Warszawa (PL)**

(56) References cited:
EP-A1- 0 172 395 GB-A- 922 663

EP 4 313 576 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The object of the invention is an apparatus for correcting shape of straw edges and a method for correcting shape of straw edges.

[0002] The food industry uses straws, which are usually made of plastic or paper, for drinking various types of beverages. They can be either one-piece or two-piece straws, straight straws or bendable straws. Plastic straws are made as a single piece, either straight or with an articulated part that allows it to be bent. The two-piece straws usually have in their structure a locking latch which connects the two parts so that, when unfolded to the using position, the beverage can be consumed without fear that the connection will be untight. This connection allows the straw to be folded, for example before the straw is wrapped in a foil from which the straw is removed before the beverage is consumed and unfolded to its maximum length. Such straws are called telescopic straws.

[0003] Telescopic straws and apparatuses for manufacturing such straws are known from the prior art.

[0004] The document EP 0 276 025 discloses a method of assembling a telescopic straw on a conveyor belt, inspecting and packing the individually assembled straws in a foil which is then welded.

[0005] The document JP03827769 discloses an apparatus for assembling a telescopic straw of two parts which are placed in grooves of a drum conveyor. In that solution, a part of a straw with a larger diameter is slid over a straw with a smaller diameter by means of pushers whose sliding movement is forced by a cam. The locking latch of the straw is made by means of a ring which presses on the outer surface of the larger diameter straw.

[0006] EP0172395A1 discloses an adjustable drinking straw system comprising straws of variable lengths that can be assembled for use. The patent focuses on methods and mechanisms for modifying the edge shapes of straws to facilitate easy assembly without deformation, enhancing the manufacturing process's efficiency. It highlights a design that corrects and optimizes the shape and diameter of straw edges, allowing for seamless integration of straws of different sizes and reducing errors in shape and assembly.

[0007] A frequently occurring problem in the state of the art is deformation of the straw edges in the process of cutting with circular knives. During the cutting process, the straw edge may be bent inwards, chafing of the straw edge may occur or the circular shape of the straw may be deformed so that it takes on for example an oval or ellipse shape. Such deformations cause an increase in the straw roundness error which may cause process difficulties or make the straw assembling process impossible. Correcting the shape of the straw edge is to be understood as acting on the straw in such a way as to minimize the roundness shape error, but also, in the case of a straw edge bent inwards, acting on the edge in such a way as to plastically deform it to obtain a diameter close to the

nominal diameter of the straw B or even to deflect it partially outwards to allow the straw A to be easily inserted into it.

[0008] Other damage is also possible during the process of conveying the straws from one machine to another or during storage. Due to the thin walls of the straws, they can become deformed after being stored for a long time, in multiple layers on top of one other.

[0009] The object of the invention is an apparatus for correcting shape of edges of second straws comprising the features of claim 1. The apparatus comprises a conveyor provided with pockets adapted to convey straws situated in two paths transversely to a conveying direction, a displacing unit adapted to longitudinally displace the conveyed second straws in the pockets of the conveyor, and situated tangentially to the circumferential surface of the conveyed second straws, and an assembling unit for assembling the straws by inserting a first straw into a second straw. The apparatus further comprises correcting elements for correcting shape of the edge of the second straw which are arranged between the conveyor pockets and adapted to inserting into the second straw, whereas the displacing unit is adapted to slide the second straw over the correcting elements for correcting shape of the edge.

[0010] Preferably, in the apparatus according to the invention, the conveyor is a drum conveyor and the correcting elements for correcting edge shape are arranged on a ring.

[0011] Preferably, in the apparatus according to the invention, the conveyor is a drum conveyor and the correcting elements for correcting edge shape are arranged on a flange.

[0012] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape are mounted adjustably relative to the pocket of the conveyor.

[0013] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape have a conical shape.

[0014] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape have a spherical shape.

[0015] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape have the shape of a pin with a rounded end.

[0016] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape have the shape of a pin with a chamfered end.

[0017] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape are fixed substantially in the axis of the pocket of the conveyor.

[0018] Preferably, in the apparatus according to the invention, the correcting elements for correcting edge shape have an outer diameter of 90-120% of the inner diameter of the second straw.

[0019] The object of the invention is also a method for

correcting the shape of an edge of a second straw comprising the features of claim 11. According to this method the straws are conveyed in pockets in two paths transversely to the conveying direction, the straws are assembled by inserting a first straw into a second straw. According to the method the second straws are slid over correcting elements for correcting edge shape situated between the pockets of a conveyor, by means of a displacing unit adapted to slide over the second straws, correcting the shape of edges of the second straws, whereas sliding the second straws over the correcting elements for correcting edge shape occurs before the first straws are inserted into the second straws.

[0020] Preferably, in the method according to the invention, the second straws are slid over the correcting elements for correcting edge shape by putting the second straws into longitudinal axial movement.

[0021] Preferably, in the method according to the invention, the second straws are slid over the correcting elements for correcting edge shape by putting the second straws into rotational motion.

[0022] Preferably, in the method according to the invention, the shape of the edges of the second straws is corrected by making at least one rotation of the second straws about the longitudinal axis.

[0023] Preferably, in the method according to the invention, the shape of the edges of the second straws on the side intended for insertion of the first straws is corrected.

[0024] An advantage of the invention is a very simple and quick method of correcting the shape of the straw edges. By using the element correcting the shapes of straw holes, the straws can be mounted one inside the other without being subjected to deformation or damage. Furthermore, the correction of the shape of the straw edges significantly increases the efficiency of the manufacturing process by minimising the number of stops of the machine caused by the incorrect shape of the straw holes.

[0025] The object of the invention is shown in more detail in a preferred embodiment in a drawing in which:

- Fig. 1 shows an apparatus for correcting the shape of straw edges in a side view;
- Fig. 2 shows a part of the apparatus for correcting the shape of straw edges in a top view;
- Fig. 3 shows the moment of folding a straw with an incorrect edge shape;
- Fig. 4 shows the first example of an incorrect edge shape of the straw B;
- Fig. 5 shows another example of an incorrect edge shape of the straw B;
- Fig. 6 shows another example of an incorrect edge

shape of the straw B;

- Fig. 7 shows another example of an incorrect edge shape of the straw B;
- Fig. 8 shows the first embodiment of an element for correcting the edge shape;
- Fig. 9 shows the second embodiment of the element for correcting the edge shape;
- Fig. 10 shows another embodiment of the element for correcting the edge shape;
- Fig. 11 shows another embodiment of the element for correcting the edge shape;
- Fig. 12 shows the moment of inserting the straw B onto the element for correcting the edge shape;
- Fig. 13 shows the moment of correcting the edge shape of the straw B;
- Fig. 14 shows the moment of pulling out the straw B from the element for correcting the edge shape;
- Fig. 15 shows the straw B after it has been pulled out of the element for correcting the edge shape;
- Fig. 16 shows the straw B after correcting the edge shape in the first embodiment;
- Fig. 17 shows the straw B after correcting the edge shape in the second embodiment;
- Fig. 18 shows the process of folding the straw A with the straw B after correcting the edge shape;
- Fig. 19 shows the element for correcting the edge shape together with an adjusting unit.

[0026] Fig. 1 shows an apparatus 1 for correcting the shape of an edge of a straw B in a side view. The apparatus 1 comprises a hopper 2, 3 for supplying the first straws of type A and the second straws of type B, the straws A being substantially longer and having an outer diameter smaller than the inner diameter of the straws B. Furthermore, one of the ends of the straw A may be bevelled at a preferably acute angle. In this embodiment, a drum conveyor 4 having pockets 5, 6 on its outer circumferential surface is shown. It is possible to have an embodiment wherein is used a belt or chain conveyor with pockets situated on the working surface conveying individually, parallel to each other, one after another longitudinally aligned pairs of the straws A and B. In order to implement the invention on the belt or chain conveyor,

it is necessary to guide at least a part of the straw flow path along a guide of cylindrical shape.

[0027] Correcting the edge shape in the light of this invention is to be understood as acting on the straw in such a way as to both minimize the roundness shape error and adjust the diameter to proper dimensions required in the straw assembling process.

[0028] In the first case, correcting the straw edge shape consists in deforming the straw edge to minimise the roundness error, e.g. by deforming a straw deformed in storage with a near elliptical cross-section to a near circular cross-section with a diameter that allows the straws A and B to be correctly assembled.

[0029] In the second case, correcting the shape consists in deflecting the straw edge bent inwards, e.g. when the diameter is too small, and acting on the edge of the straw in such a way as to plastically deform it to a diameter that allows the straws A and B to be correctly assembled.

[0030] Shape correcting is also to be understood as a shape correction operation comprising both shape correcting to compensate for roundness error and deflecting the inwardly bent straw edge.

[0031] All these functions are performed by correcting elements 7 according to the present invention.

[0032] The hopper 2 and 3 is placed above the conveyor 4, tangentially to its working surface, so that during the rotation of the conveyor 4, the straws A and B are picked up from the hopper 2 and 3 into the pockets 5, 6. The straw A placed in the pocket 5 is directed by its bevelled end towards the straw B aligned with it longitudinally and placed in the adjacent pocket 6, the straws being conveyed transversely to the conveying direction.

[0033] Then, during the rotation of the conveyor 4 in the direction indicated by the arrow R_1 , the straws B are displaced in the direction of the edge shape correcting element for correcting straws B, as shown in detail in Fig. 2. Further in the description, the edge shape correcting elements 7 will be referred to as correcting elements 7. The correcting elements 7 are positioned between two paths for transporting the straws A and the straws B on a ring 8, substantially coaxial with the pockets 6 and the straws B. Furthermore, the ring 8 is situated on the same axis X as the conveyor 4 between the pockets 6 and 5. In this embodiment one correcting element 7 is assigned to each of the pockets 6. It is also possible to have an embodiment where the number of the correcting elements 7 will be smaller than the number of the pockets 6 situated on the circumference of the conveyor 4. In such a case, the correcting elements 7 will move in a loop overlapping for a certain section of their path with the path of the pockets 6 of the conveyor 4 where they will reach a position of momentary alignment with the grooves 6.

[0034] It is also possible to build such conveyor 4 wherein, between the pockets 5 and 6, there will be a conveyor flange on which, on the side of the pockets 6, there will be the correcting elements 7 having a longitudinal axis aligned with the axis of the pocket 6. In one

embodiment, the edge shape correcting elements 7 are fixed adjustably relative to the pocket 6 of the conveyor.

[0035] There are feasible embodiments wherein the edge shape correcting elements 7 have a conical or spherical shape, a shape of a pin with a rounded end or a shape of a pin with a chamfered end.

[0036] In the shown embodiment of the apparatus 1, the straws B are displaced in the direction of the correcting elements 7 by means of a displacing unit 20. Furthermore, the displacing unit 20 comprises a roller 9 with a concave working surface, positioned above the conveyor 4 tangentially to the straws B conveyed in the pockets 6 on its circumferential surface and substantially perpendicular to the axis X. The concave shape of the working surface of the roller 9 and the substantially perpendicular orientation relative to the conveyed straws B in the pockets 6 of the conveyor rotating in the direction R_1 causes the straws B to be put into rotation about their longitudinal axes coinciding with the longitudinal axis X_1 of the pocket 6. Furthermore, whilst the roller 9 contacting with the conveyed straws B, the roller 9 is put into rotation in the direction T_1 by means of a drive not shown in the figure. This solution makes it possible to adjust the speed of rotation of the roller 9, and thus the distance over which the straws B is arranged to move along the axis X_1 . Furthermore, the time, the number of rotations of the straw B when mounted on the correcting element 7 and the force of pressure of the straw B on the pin of the correcting element 7 can be adjusted as required, depending on the type of deformation of the end of the straw B to be corrected. There is a feasible embodiment wherein, after sliding the straw B over the correcting element 7, the shape of the edge 14 of the second straw B is additionally corrected by making at least one rotation about the longitudinal axis of the second straw. Preferably, the shape of the edge of the second straw B is corrected on the side intended for the insertion of the first straw A.

[0037] After a sufficient number of rotations of the straws B on the correcting element 7, the straws B are slid down therefrom and displaced axially longitudinally in the pockets 6 towards the lateral edge of the conveyor 11. Sliding down and longitudinal displacement in the pockets 6 is forced by a roller 10 with a concave working surface which, like the roller 9, is situated above the conveyor 4 tangentially to the straws B conveyed in the pockets 6 on its circumferential surface and substantially perpendicular to the axis X. The roller 10 rotates in the direction T_2 , opposite to the movement of the roller 9. After the longitudinal axial displacement of the straws B to the edge 11, the straws are conveyed to the assembling unit 12 on which the straws A are assembled in the straws B.

[0038] The rollers 9 and 10 are positioned tangentially to the circumferential surface of the conveyor 4 in such a way that the working surfaces 9 and 10 of the rollers are in contact with at least three straws B situated in adjacent pockets 6.

[0039] When mounting of straws A in the straws B, there may occur a problem with inserting the straw A into the straw B due to an incorrect shape of the edge 14 of the hole 13 of the straw B, as shown in detail in Fig.3. The incorrect shape of the edge 14 of the hole 13 may arise during the earlier process of cutting the straw B with a circular knife resulting in the folding of the edge 14 inwards the straw. In such a case, the edge 15 of the straw A collides with the edge 14 of the straw B when the straw A is inserted towards the straw B which is aligned with it.

[0040] Other damage is also possible during the process of conveying the straws from one machine to another or during storage. Due to the thin walls of the straws, they can become deformed after being stored for a long time, in multiple layers on top of one another. Figs. 4 -7 show examples of deformation of the shape of the hole 13 of the straw B in a cross-section and in a front view. The deformations shown are not a closed group of defects that may occur and affect the shape of the edge 14 of the hole 13 of the straw B.

[0041] In order to eliminate the mentioned problem of the incorrect shape of the edge 14 of the hole 13 of the straw B, the correcting elements 7 are provided in the apparatus 1. The correcting elements 7, in this embodiment, are situated on the ring 8, on its lateral surface 16.

[0042] In Figs. 8-11, only examples of shapes that the correcting elements 7 may have are shown, and they do not constitute a closed group. An important feature of the invention is that the correcting element 7 enters through the hole 13 of the straw B, at least partially inside the straw B while correcting the shape error of the edge 14. The outer diameter D_1 of the correcting element 7 should correspond to 90-120% of the value of the inner diameter D_2 of the straw B.

[0043] In order to eliminate shape errors of the edge 14 of the straw B, by means of an assembling element, in this embodiment of the roller 9, the straws B are slid over the correcting elements 7 which are positioned between two axially aligned pockets 5 and 6.

[0044] Fig. 12 shows the moment of mounting the straw B put in rotational and longitudinal motion axially onto the correcting element 7. When mounting the straw B onto the correcting element 7 the shape of the incorrectly formed edge 14 is corrected as shown in Fig. 13 and Fig. 17. Depending on the final effect of the shape of the edge 14 to be obtained, the straw B may be mounted deeper onto the correcting element 7 by making both longitudinal and rotational movement at the same time. Such adjustment of the shape of the edge 14 as that shown in Fig. 14 -16 is also allowable. The deflection of the edge 14 should be great enough to allow an easy insertion of the straw A into it. Then the straw B is slid down from the correcting element 7 by means of the roller 10 not shown in the figure and is transferred to a further process of assembling the straw A into it as shown in Fig. 18. After the process of correction of the shape of the edge 14, the straw A is inserted, in a collision-free man-

ner, into the straw B. The correction of the shape uses the phenomenon of plasticity and formability of the paper of which the corrected straws are made.

[0045] Fig. 19 shows the correcting element 7 together with an adjusting unit 17 enabling the correcting element 7 to be appropriately positioned relative to the axis X_1 of the pocket 6.

[0046] The position of the ring 8, on which the correcting elements 7 are placed, can be adjusted relative to the pocket 6 along the axis X_1 , for example when a straw B of changed length is used in the straws assembling process. Furthermore, the ring 8 can also vary its position transversely to the axis X_1 , for example when a straw B of changed diameter is used in the straw assembling process.

[0047] In order to vary the position of the ring 8, an adjusting unit 17 comprising a controller 18 transmitting appropriate signals to actuators 19 varying the position of the ring 8 may be used.

[0048] It is also possible to manually vary the position of the ring 8 between the pockets 5 and 6 of the conveyor 4, for example by using spacer rings on one or both sides of the ring 8.

[0049] In this case, before any variation in the length of the assembled straws, a spacer ring, which increases or reduces the distance of the correcting element 7 from the pockets 5, 6, is placed between the portion of the conveyor 4 containing the pockets 5 and/or 6 and the ring 8.

[0050] The invention makes it possible to increase the paper straw assembling efficiency by eliminating geometric collisions encountered in state-of-the-art solutions and resulting from the cutting, conveying or storing process. The introduction of the shape correction immediately before or at a small processing distance preceding the assembling operation allows applying small forces and a gentle interference with the material. According to the invention, the effects of the shape correction need not be permanent, nevertheless they must persist for a period of time allowing the transfer to the assembling unit. Since the shape correction according to the invention takes place individually for straws already prepared in the processing operation preceding the assembling, the fulfilment of the time condition is simple and the applied shape correction forces can be small.

Claims

1. An apparatus for correcting the shape of an edge of a second straw (B) comprising
 - a conveyor (4) provided with pockets (5, 6) adapted to convey first and second straws (A, B) situated in two paths transversely to the conveying direction;
 - a displacing unit (20) adapted to longitudinally displace the conveyed second straws (B) in the

- pockets (6) of the conveyor (4), and positioned tangentially to the circumferential surface of the conveyed second straws (B),
 an assembling unit (12) for assembling the first and second straws (A, B) by inserting a first straw (A) into
 a second straw (B),
 wherein
 between the pockets (5,6) of the conveyor (4) there are arranged correcting elements (7) for correcting shape of the edge (14) of the second straw (B) and adapted to inserting into the second straw (B), whereas
 the displacing unit (20) is adapted to slide the second straw (B) over the correcting element (7) for correcting shape of the edge (14).
2. The apparatus as in claim 1, **characterized in that** the conveyor (4) is a drum conveyor and the correcting elements (7) for correcting edge shape are arranged on a ring (8).
3. The apparatus as in claim 1, **characterized in that** the conveyor (4) is a drum conveyor and the correcting elements (7) for correcting edge shape are arranged on a flange.
4. The apparatus as in any of the claims 1 to 3, **characterized in that** the correcting elements (7) for correcting edge shape are mounted adjustably relative to the pocket (6) of the conveyor (3).
5. The apparatus as in any of the claims 1 to 4, **characterized in that** the correcting elements (7) for correcting edge shape have a conical shape.
6. The apparatus as in any of the claims 1 to 4, **characterized in that** the correcting elements (7) for correcting edge shape have a spherical shape.
7. The apparatus as in any of the claims 1 to 4, **characterized in that** the correcting elements (7) for correcting edge shape have the shape of a pin with a rounded end.
8. The apparatus as in any of the claims 1 to 4, **characterized in that** the correcting elements (7) for correcting edge shape have the shape of a pin with a chamfered end.
9. The apparatus as in any of the claims 1 to 8, **characterized in that** the edge shape correcting elements (7) for correcting edge shape are fixed substantially in the axis of the pocket (6) of the conveyor (4).
10. The apparatus as in any of the claims 1 to 9, **characterized in that** the correcting elements (7) for correcting edge shape have an outer diameter of 90-120% of the inner diameter of the second straw (B).
11. A method of correcting the shape of an edge of a second straw (B) wherein
 first and second straws (A, B) are conveyed in pockets (5, 6) in two paths transversely to the conveying direction;
 the first and second straws (A, B) are assembled by inserting a first straw (A) into a second straw (B)
 wherein
 the second straws (B) are slid over correcting elements (7) for correcting shape of the edges (14) situated between the pockets (5,6) of a conveyor (4), by means of a displacing unit (20) adapted to slide over the second straws (B), correcting the shape of edges (14) of the second straws (B), whereas
 sliding the second straws (B) over the correcting elements (7) for correcting edge shape occurs before the first straws (A) are inserted into the second straws (B)
12. The method as in claim 11, **characterized in that** the second straws (B) are slid over the correcting elements (7) for correcting shape of the edges (14) by putting the second straws (B) into longitudinal axial movement.
13. The method as in claim 11 or 12, **characterized in that** the second straws (B) are slid over the correcting elements (7) for correcting edge shape by putting the second straws (B) into rotational motion.
14. The method as in any of the claims 11 to 13, further **characterized in that** the shape of the edges (14) of the second straws (B) is corrected by making at least one rotation of the second straws (B) about the longitudinal axis.
15. The method as in claim 11, 12, 13 or 14, **characterized in that** the shape of the edges (14) of the second straws (B) on the side intended for insertion of the first straws (A) is corrected.
- 50 **Patentansprüche**
1. Eine Vorrichtung zur Korrektur der (z) Form einer Kante eines zweiten Halms (z) (B) umfassend ein Förderband (4) ausgestattet mit Taschen (5, 6) zur Förderung von (z) ersten und zweiten (z) Halms (A, B), die in zwei Bahnen quer zur Förderrichtung;
 eine Verschiebeeinheit (20), die geeignet ist, die

- geförderten zweiten Halme (B) in den Taschen (6) des Förderbandes (4) in Längsrichtung zu verschieben, und tangential zu der Umfangsfläche der geförderten zweiten Halme (B) positioniert,
eine Montageeinheit (12) für die Montage der (z) ersten und zweiten (z) Halme (A, B) durch Einsetzen eines ersten Halms (A) in einen zweiten Halm (B),
(z) wobei (z) zwischen den Taschen (5,6) des Förderbandes (4) Korrekturlemente (7) angeordnet sind, um die Form der Kante (14) des zweiten Halms (B) zu korrigieren und an das Einstecken in den zweiten Halm (B) anzupassen, während die Verschiebeeinheit (20) so ausgelegt ist, dass sie den zweiten Halm (B) über das Korrekturlement (7) schiebt, um die Form des Randes (14) zu korrigieren.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Förderband (4) ein Trommelförderband ist und die Korrekturlemente (7) zur Korrektur der Kantenform auf einem Ring (8) angeordnet sind.
3. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Förderband (4) ein Trommelförderband ist und die Korrekturlemente (7) zur Korrektur der Kantenform an einem Flansch angeordnet sind.
4. Die Vorrichtung gemäß einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** die Korrekturlemente (7) zur Korrektur der Kantenform relativ zur Tasche (6) des Förderbandes (3) verstellbar angebracht sind.
5. Vorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Korrekturlemente (7) für die Korrektur der Kanten Form eine konische Form haben.
6. Vorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Korrekturlemente (7) zur Korrektur der Kantenform eine kugelförmige Form haben.
7. Vorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Korrekturlemente (7) zur Korrektur der Kantenform die Form einer Nadel mit einem abgerundeten Ende haben.
8. Die Vorrichtung nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** die Korrekturlemente (7) zur Korrektur der Kanten die Form eines Stiftes mit einem abgeschrägten Ende haben.
9. Die Vorrichtung nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** die Kanten Formkorrekturlemente (7) zur Korrektur der Kanten Form im Wesentlichen in der Achse der Tasche (6) des Förderbandes (4) befestigt sind.
10. Die Vorrichtung wie in einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** die Korrekturlemente (7) zur Korrektur der Kantenform einen Außendurchmesser von 90-120 % des Innendurchmessers des zweiten Halms (B) haben.
11. Verfahren zum Korrigieren der Form einer Kante eines zweiten Halms (B), wobei (z) der erste und zweite (z) Halm (A, B) in Taschen sind, (5, 6) die in zwei Bahnen quer zur Förderungsrichtung bewegt werden;
die (z) ersten und zweiten (z) Halme (A, B) zusammengefügt werden, indem ein erster Halm (A) in einen zweiten Halm (B) eingelegt wird
(z) wobei (z),
die zweiten Halme (B) über die Korrekturlemente (7) zur Korrektur der Form der Kanten (14) geschoben werden, die sich zwischen den Taschen (5,6) eines Förderbandes (4) befinden, durch eine verschiebenden Einheit (20), die geeignet ist über die zweiten Halme (B) zu gleiten, wobei die Form der Kanten (14) der zweiten Halme (B) korrigiert wird, wobei das Schieben der zweiten Halme (B) über die Korrekturlemente (7) zur Korrektur der Kantenform erfolgt, bevor die ersten Halme (A) in die zweiten Halme (B) eingesetzt werden.
12. Verfahren nach Anspruch 11, **dadurch gekennzeichnet, dass** die zweiten Halme (B) über die Korrekturlemente (7) zur Korrektur der Form der Kanten (14) geschoben werden, indem die zweiten Halme (B) in längsaxiale Bewegung versetzt werden.
13. Das Verfahren wie in Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** die zweiten Halme (B) über die korrigierenden Elemente (7) zur Korrektur der Kantenform geschoben werden, indem die zweiten Halme (B) in Drehbewegung versetzt werden.
14. Das Verfahren ist wie in jedem der Ansprüche 11 bis 13, weiterhin **dadurch gekennzeichnet, dass** die Form der Ränder (14) der zweiten Halme (B) durch mindestens eine Drehung der zweiten Halme (B) um die Längsachse korrigiert wird.
15. Das Verfahren wie in Anspruch 11, 12, 13 oder 14, **dadurch gekennzeichnet, dass** die Form der Ränder (14) der zweiten Halme (B) auf der Seite, die zum

Einsetzen der ersten Halme (A) bestimmt ist, korrigiert wird.

Revendications

1. Un appareil pour corriger (z) la forme d'un bord d'une deuxième paille (z) (B) comprenant un convoyeur (4) muni de compartiments (5, 6) adaptés pour transporter (z) les premières et deuxièmes (z) pailles (A, B) situées dans deux trajectoires transversalement par rapport au sens de convoyage ;

une unité de déplacement (20) adaptée pour déplacer longitudinalement les deuxièmes pailles (B) transportées vers les compartiments (6) du convoyeur (4), et positionnée tangentielle-ment à la surface circonférentielle des deuxièmes pailles transportées (B),

une unité d'assemblage (12) pour assembler les (z) premières et deuxièmes (z) pailles (A, B) en insérant une première paille (A) dans une deuxième paille (B),

(z) dans lequel (z) entre les compartiments (5, 6) du convoyeur (4) sont disposés des éléments correcteurs (7) pour corriger la forme du bord (14) de la deuxième paille (B) et sont adaptés pour s'insérer dans la deuxième paille (B), tandis que l'unité de déplacement (20) est adaptée pour faire glisser la deuxième paille (B) sur l'élément de correction (7) pour corriger la forme du bord (14).

2. L'appareil selon la revendication 1, **caractérisé en ce que** le convoyeur (4) est un convoyeur à tambour et que les éléments correcteurs (7) pour corriger la forme des bords sont disposés sur un anneau (8).

3. L'appareil selon la revendication 1, **caractérisé en ce que** le convoyeur (4) est un convoyeur à tambour et que les éléments correcteurs (7) pour corriger la forme des bords sont disposés sur une bride.

4. L'appareil selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** les éléments correcteurs (7) pour corriger la forme des bords sont montés de manière ajustable par rapport au compartiment (6) du convoyeur (3).

5. L'appareil selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les éléments correcteurs (7) pour corriger la forme des bords ont une forme conique.

6. L'appareil selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les éléments correcteurs (7) pour corriger la forme des bords

ont une forme sphérique.

7. L'appareil selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les éléments correcteurs (7) pour corriger la forme des bords ont une forme de goupille à l'extrémité arrondie.

8. L'appareil selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que** les éléments correcteurs (7) pour corriger la forme des bords ont la forme d'une goupille à l'extrémité biseautée.

9. L'appareil selon l'une quelconque des revendications 1 à 8, **caractérisé en ce que** les éléments correcteurs (7) de la forme des bords pour corriger la forme des bords sont fixés de manière substantielle dans l'axe du compartiment (6) du convoyeur (4).

10. L'appareil selon l'une quelconque des revendications 1 à 9, **caractérisé en ce que** les éléments correcteurs (7) pour corriger la forme des bords ont un diamètre extérieur de 90 à 120 % supérieur au diamètre intérieur de la deuxième paille (B).

11. Une méthode de correction de la forme d'un bord d'une deuxième paille (B) dans laquelle (z) les premières et deuxièmes (z) pailles (A, B) sont transportées vers des compartiments (5, 6) dans deux trajectoires transversalement par rapport au sens de convoyage ;

les (z) premières et deuxièmes (z) pailles (A, B) sont assemblées en insérant une première paille (A) dans une deuxième paille (B) (z) dans laquelle (z)

les deuxièmes pailles (B) sont glissées sur des éléments correcteurs (7) pour corriger la forme des bords (14) situés entre les compartiments (5, 6) d'un convoyeur (4), au moyen d'une unité de déplacement (20) adaptée pour glisser sur les deuxièmes pailles (B), corrigeant la forme des bords (14) des deuxièmes pailles (B), tandis que

le glissement des deuxièmes pailles (B) sur les éléments correcteurs (7) pour corriger la forme des bords a lieu avant que les premières pailles (A) ne soient insérées dans les deuxièmes pailles (B).

12. La méthode selon la revendication 11, **caractérisée en ce que** les deuxièmes pailles (B) sont glissées sur les éléments correcteurs (7) pour corriger la forme des bords (14) en plaçant les deuxièmes pailles (B) dans un mouvement axial longitudinal.

13. La méthode selon la revendication 11 ou 12, **caractérisée en ce que** les deuxièmes pailles (B) sont

glissées sur les éléments correcteurs (7) pour corriger la forme du bord en plaçant les deuxièmes pailles (B) en mouvement de rotation.

14. La méthode selon l'une quelconque des revendications 11 à 13, **caractérisée par** ailleurs en ce que la forme des bords (14) des deuxièmes pailles (B) est corrigée en effectuant au moins une rotation des deuxièmes pailles (B) autour de l'axe longitudinal.
15. La méthode selon la revendication 11, 12, 13 ou 14, **caractérisée en ce que** la forme des bords (14) des deuxièmes pailles (B) du côté prévu pour l'insertion des premières pailles (A) est corrigée.

5

10

20

25

30

35

40

45

50

55

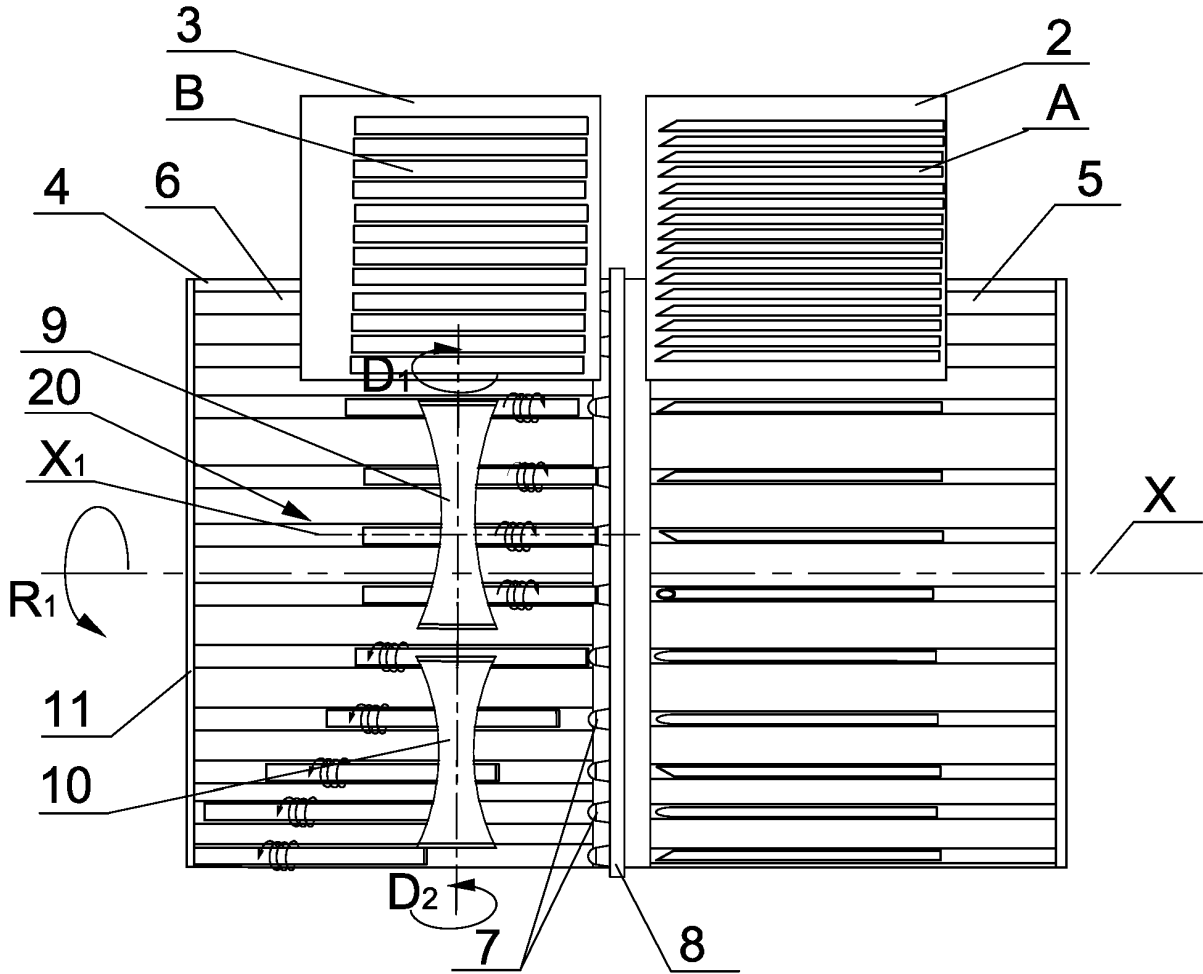


Fig. 2

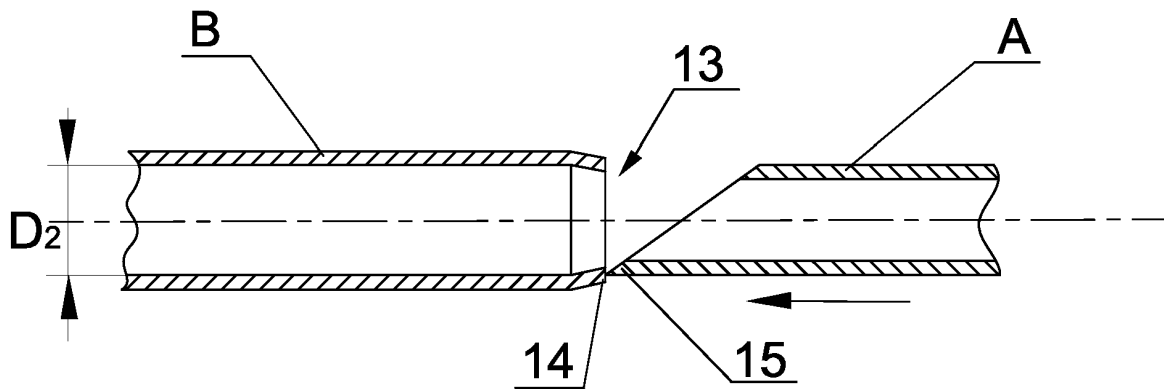


Fig. 3

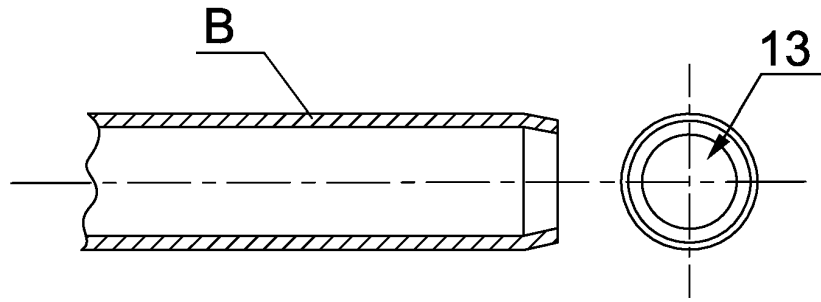


Fig. 4

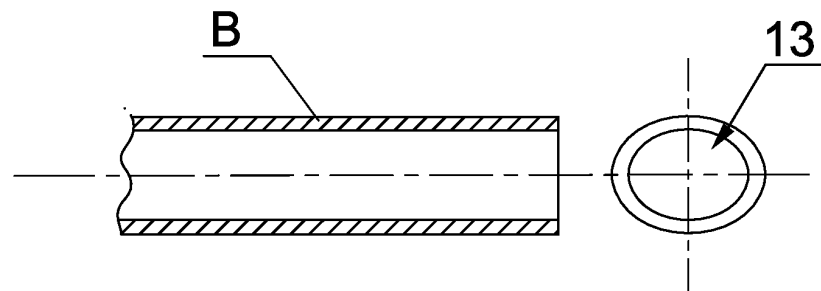


Fig. 5

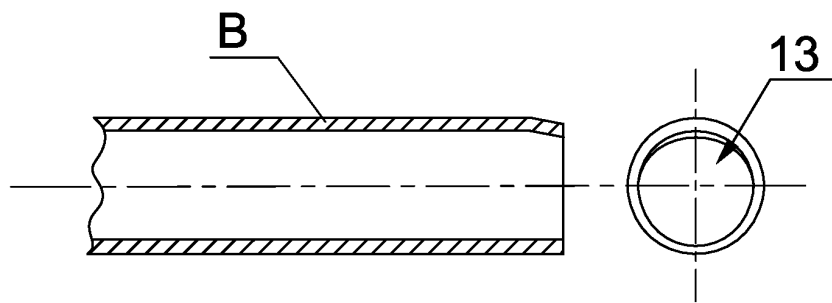


Fig. 6

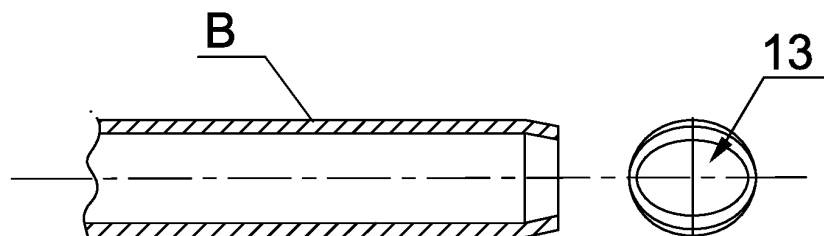


Fig. 7

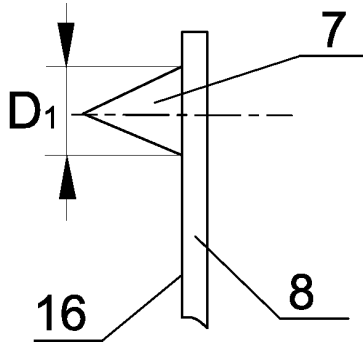


Fig. 8

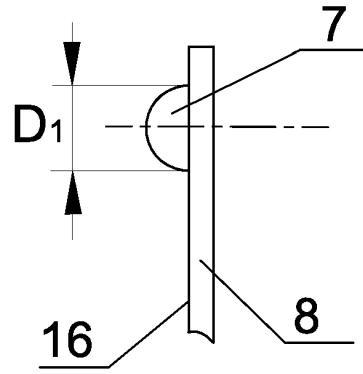


Fig. 9

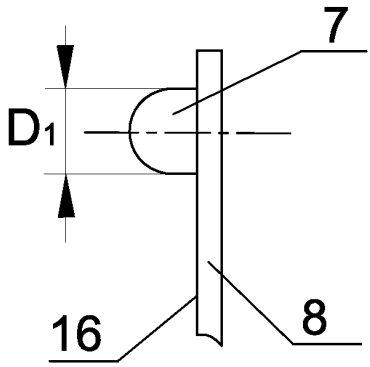


Fig. 10

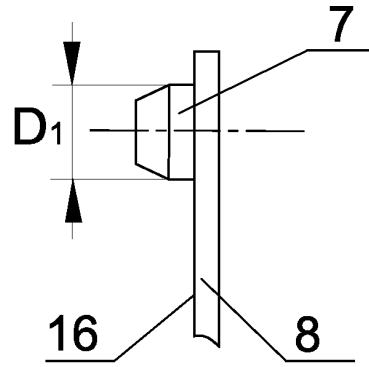


Fig. 11

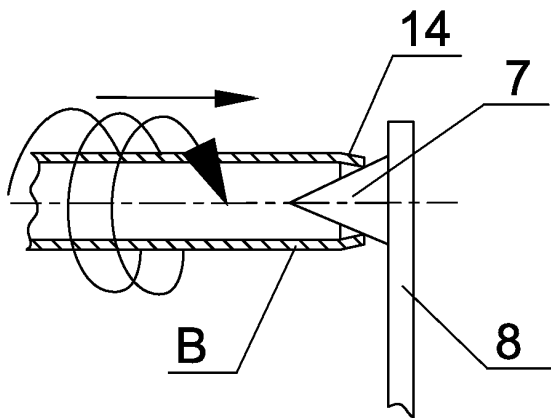


Fig. 12

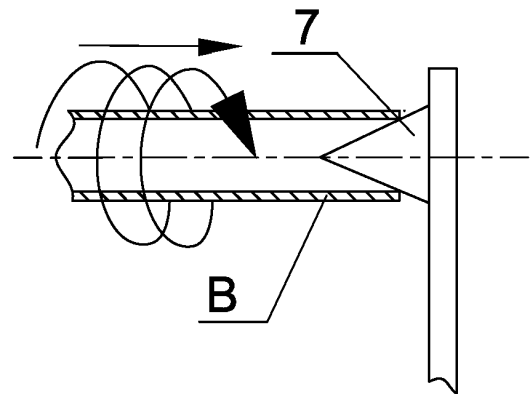


Fig. 13

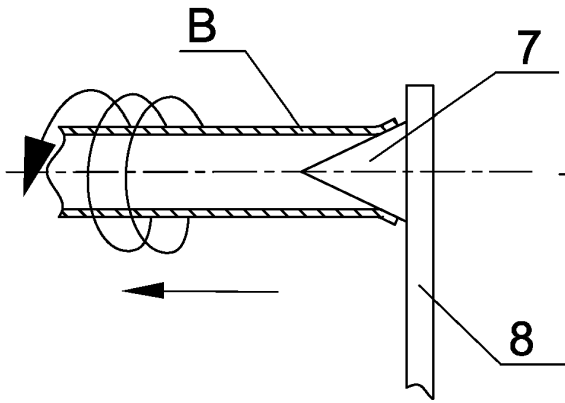


Fig. 14

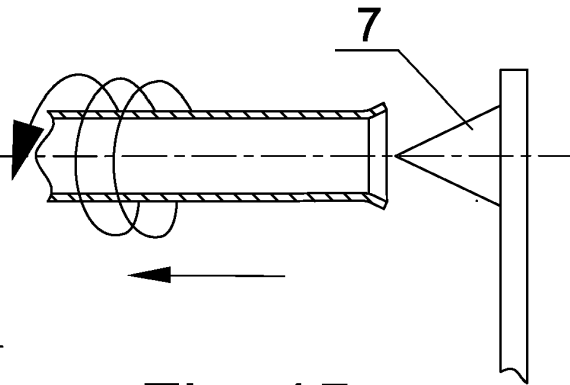


Fig. 15

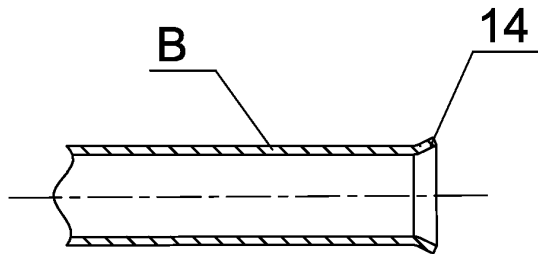


Fig. 16

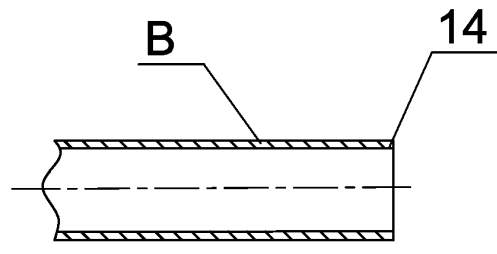


Fig. 17

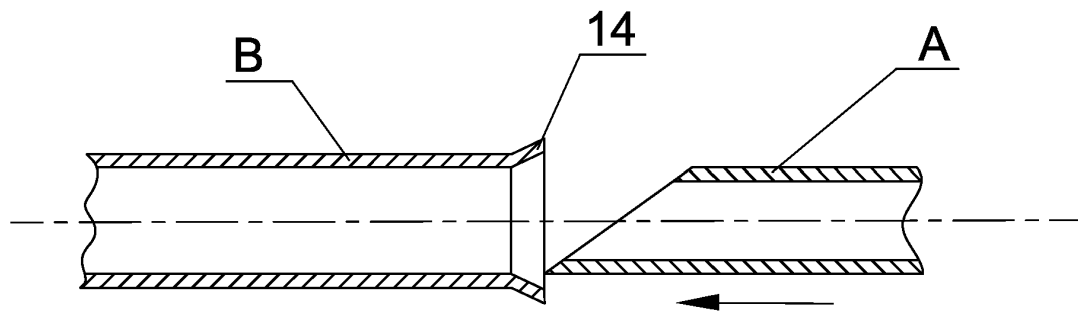


Fig. 18

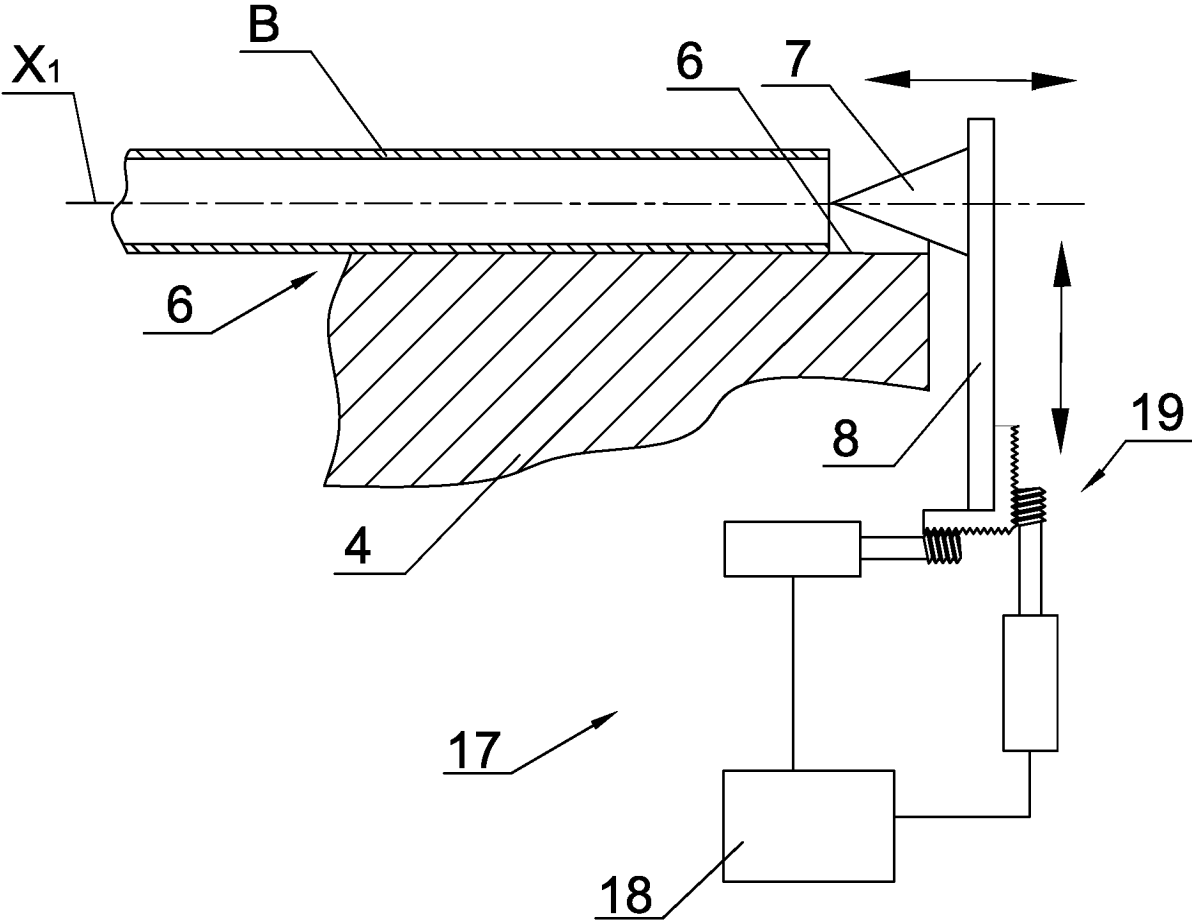


Fig. 19

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

- EP 0276025 A [0004]
- EP 0172395 A1 [0006]
- JP 03827769 B [0005]