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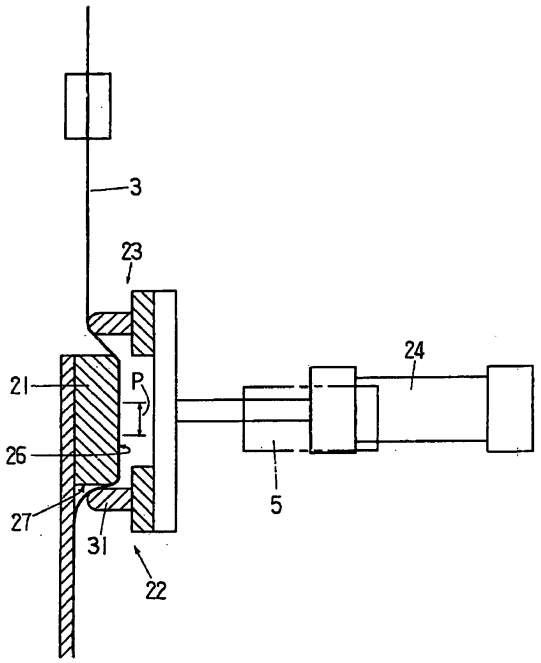
(54) Bag filling and packaging method and bag filling and packaging apparatus

(57) In a bag filling and packaging method and apparatus, first and second bag pressing members (22, 23) being provided a specific distance apart in the lengthwise direction of a bag (3) and respectively having pressing components (31) that extend in the width direction of the bag (3). The bag pressing members (22, 23) are moved toward a rear plate (21) which is provided on the rear side of the bag (3), so that the pressing component (31) of the first bag pressing member (22) and an end face of the rear plates (21) hold the bag (3), and the pressing component (31) of the second pressing member (23) pushes a position of the bag (3) above a receiving face (26) of the rear plate (21), allowing the bag face including the print part (P) to be taut along the receiving face (26) of the rear plate (21), and printing or print inspection is performed in this configuration.

FIG. 5



EP 2 332 844 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a bag filling and packaging method and a bag filling and packaging apparatus in which printing and/or print-inspection are/or executed as one of packaging steps.

2. Description of the Related Art

[0002] FIG 12 shows an example of a common intermittently rotating bag filling and packaging apparatus. In this packaging apparatus, a plurality of gripper pairs (pairs of grippers) 2 are equidistantly provided around a table 1 that intermittently rotates in one direction (in the direction of the white arrow). As the table 1 makes the intermittent rotation, the gripper pairs 2 are intermittently moved along a circular conveyance path; and while the gripper pairs 2 are making one rotation, various packaging processing steps are carried out, such as supplying bags 3 to the gripper pairs 2 (bag feeding), filling the bags 3 with their contents while the bags are gripped at the edges on both sides by the gripper pairs 2, and sealing the openings (bag mouths) of the bags 3. The conveyance path of the gripper pairs 2 is also the conveyance path of the bags 3.

[0003] The above operation will be described below more specifically with reference to FIG 12. The stopping position I is a bag feeding step position, and at this stopping position I, a conveyor magazine type bag feeder 4 that supplies bags 3 to the gripper pairs 2 is provided. The supplied bags 3 are open at their upper edges, and the edges on both sides near the opening (bag mouth) are gripped by the gripper pairs 2. The bags hang down with the opening facing up.

[0004] The stopping position II is a printing step position, and at this stopping position II a printing device (only the printer 5 is shown) that prints the date, etc. on a bag face of the bags 3 gripped by the gripper pairs 2 is provided. If the bags 3 are those on which date, etc. has been printed previously, then a print inspection device is provided as needed instead of the printing device, and a print-inspection step is carried out. In some cases, printing and print inspection are carried out at the same stopping position.

[0005] The stopping position III is a position at which the upper end opening (bag mouth) of each bag is opened up. A this stopping position III, an opening device including a pair of suction members (suction cups) 6 that can move toward and away from each other and a pair of follower-type opening guides 7 (only the suction cups 6 and the opening guides 7 are shown in the drawing) is provided. The stopping position IV is a content-filling step position, and a filling device including a hopper 8 that goes up and down (only the hopper 8 is shown in the drawing) is provided at this content-filling step position. The follower-type opening guides 7 are inserted into the opened bag at the stopping position III and immediately opened up the bag to keep the bag mouth open; and by the rotation of the table 1 (that makes the movement of the gripper pairs 2 and the bags 3) the guides 7 are moved to the stopping position IV After the hopper 8 are inserted into the bag mouth at the stopping position IV, the guides 7 are raised up out of the bag mouth and immediately returned to the stopping position III.

[0006] The stopping position V is a first gas replacement step position, and at this stopping position V, a first gas displacement device including a gas blow-in nozzle 9 that goes up and down (only the gas blow-in nozzle 9 is shown in the drawing) is provided. The stopping position VI is a second gas replacement step position, and a second gas displacement device including a gas blow-in nozzle 11 that goes up and down (only the gas blow-in nozzle 11 is shown in the drawing) is provided at this stopping position VI. At the stopping position VI (the second gas replacement step position), the spacing between the gripper pairs 2 is widened until the bag mouth is taut.

[0007] The stopping position VII is a first sealing step position, and at this stopping position VII a first sealing device including a pair of first heat plates 12 that open and close (only the first heat plates 12 are shown) is provided. The stopping position VIII is a second sealing step position, and a second sealing device including a pair of second heat plates 13 (only the second heat plates 13 are shown) are provided at this second sealing step position. The stopping position IX is a seal cooling and finished bag release step position. A cooling device having a pair of cooling plates 14 (only the cooling plates 14 are shown) and a chute 15 are provided at the stopping position IX.

[0008] The stopping position X is a defective bag release step position, and at this stopping position X defective bags (such as empty bags that were not filled because they were not properly opened) are released.

[0009] At the stopping position II, letters and/or symbols are printed (mainly by inkjet) on the surface of the bag, or the printed letters or symbols are imaged with an imaging means (camera), and this image is used to inspect the printing and see if it is as it should be (whether the printing is there, or the printing is partially missing, too faint, distorted, incorrect, etc.).

[0010] Japanese Patent Application Laid-Open (Kokai) No. 2000-109033 and Japanese Patent No. 3,282,803 disclose a print or print-inspection assisting device that is used in such a printing step or print-inspection step. This print or print-inspection assisting device includes a rear plate and a pressing plate which is formed with a window that surrounds the print part of the bag (an area in which printing will be performed or an area in which printing has been performed) of a bag, and this print or print-inspection assisting device performs printing or print inspection through the window in a state that the bag face is sandwiched from both sides between the

rear plate and the pressing plate. In this method, since a bag can be kept completely still by clamping it by the rear plate and the pressing plate, any printing defects or missed problems in print inspection caused by looseness of the bag can be prevented.

[0011] Meanwhile, the bag faces of bags are generally warped, wavy, or otherwise curved, and the direction of this curvature is usually the lengthwise direction of the bag (that is, the axis of curvature is in the bag width direction) (see FIG 13(a)). In such a case, if the bag face is clamped by a rear plate and a pressing plate, the bag face portion that comes into the window (the bag face that includes the print part) will bulge out in a convex shape (see FIG 13(b)); and if the print part is printed or inspected for printing in this state, there is the possibility that printing defects will occur or that problems in print inspection will be missed. Also, since the bag face around the print part is clamped in a plane all the way around, some wrinkling can occur in the clamped bag face, and this may mar the appearance (and the commercial value) of the bag.

[0012] FIGS. 13(a) and 13(b) show a curved bag shape and the structure of a conventional print assisting device or print-inspection assisting device. In FIGS. 13(a) and 13(b), the reference numeral 16 is a rear plate, 17 is a pressing plate, and 18 is a window formed in the pressing plate 17. In addition, the reference numeral 2 is a gripper, 3 is a bag, and 5 is a printer or a print inspection camera.

BRIEF SUMMARY OF THE INVENTION

[0013] The present invention was made in light of the above problems encountered in the printing step or print-inspection step out of a series of bag filling and packaging steps, and it is an object of the present invention to prevent printing defects or missed problems in print inspection even if the bag face is warped or wavy. It is another object to keep the bag face from wrinkling during the printing or print-inspection step.

[0014] The above-described objects are accomplished by a unique structure of the present invention for a bag filling and packaging method in which the open end of a bag is held while the bag is carried along a specific conveyance path, and packaging steps, such as filling the bag with its contents and closing up the opening, are sequentially carried out while the bag is being conveyed; and in the present invention,

a printing step (or a print-inspection step) is performed before the content-filling step (as one of the packaging steps), and in this printing step (or print-inspection step) the bag face that includes a print part is pulled taut in the length direction or width direction of the bag, so that printing (or print inspection) is performed in a state in which the print part of the bag is flat.

[0015] The printing step and the print-inspection step can be both included in the packaging steps. Furthermore, with a standard bag such as that shown in FIGS. 12 and 13(a) and 13(b), the packaging steps generally include an bag mouth opening step, and a printing step and/or a print-inspection step is provided before this bag mouth opening step.

[0016] The above-described objects are also accomplished by another unique structure of the present invention for a bag filling and packaging apparatus in which the open end of a bag is held while the bag is carried along a specific conveyance path, and packaging steps, such as filling the bag with its contents and closing up the opening, are sequentially carried out while the bag is being conveyed; and in the present invention,

a printing step (or a print-inspection step) is performed before the content-filling step (as one of the packaging steps), and at the position where the printing step (or print-inspection step) is performed, a printing device (or a print inspection device) and a print assisting device (or a print-inspection assisting device) in which the bag face that includes a print part is pulled taut in the length direction or width direction of the bag are provided, so that printing is performed in a state in which the print part of the bag is flat.

[0017] Both printing step and print-inspection step may be performed in the packaging steps. The assisting device is operated prior to the printing or print inspection performed by the printing device or print inspection device, and the print part of the bag is maintained in a flat state. The assisting device, therefore, can be called a bag tautness maintenance means.

[0018] The assisting device (print assisting device or print-inspection assisting device) may have the following specific constitutions.

(1) The assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other. The rear plate is provided on the rear face side of the bag, and the pair of pressing members is provided on the front side of the bag, that is, on the bag face side where the print part of the bag is located.

[0019] The rear plate has a flat receiving face that corresponds to the print part of the bag.

[0020] The pair of pressing members comprise a bag bottom-side pressing member and a bag opening-side pressing member which are provided a specific distance apart in the lengthwise direction of the bag, and each one of these pressing members has a pressing component that extends in the width direction of the bag.

[0021] The pressing component of the bag bottom-side pressing member sandwiches, in the width direction of the bag, a position on the bag bottom side from the print part of the bag, between this pressing component and the rear plate, so as to hold the bag. The pressing component of the bag opening-side pressing member presses a position that is on the opening side from the receiving face of the rear plate in the rear face-side direction.

[0022] In a state in which the bag is held by the rear

plate and the pressing component of the bag bottom-side pressing member, the pressing component of the bag opening-side pressing member is pushed in beyond the receiving face of the rear plate in the rear face-side direction of the bag, so that the bag face that includes the print part of the bag is kept taut along the receiving face of the rear plate.

(2) Examples of a more specific constitution in the structure of (1) above are that the bag is held between the receiving face of the rear plate and the pressing component of the bag bottom-side pressing member, and that the rear plate has a bag bottom-side end face on the bag bottom side of the receiving face, and the bag is held between the bag bottom-side end face and the pressing component of the bag bottom-side pressing member.
(3) In the structures of (1) and (2) above, the rear plate and the bag bottom-side pressing member are moved toward and away from each other. In this case, the relative movement modes include:

(a) the rear plate is provided at a receiving position that is a fixed position, and the bag bottom-side pressing member is movable between a holding position at which the bag is held between this pressing member and the rear plate and a standby position that is away from the bag,
(b) the bag bottom-side pressing member is provided at a holding position that is a fixed position, and the rear plate is movable between a receiving position at which the bag is held between the rear plate and the bag bottom-side pressing member and a standby position that is away from the bag, and
(c) the bag bottom-side pressing member is movable between a holding position at which the bag is held between this pressing member and the rear plate and a standby position that is away from the bag, and the rear plate is movable between a receiving position at which the bag is held between the rear plate and the bag bottom-side pressing member and a standby position that is away from the bag.

[0023] Any of the above modes is applicable in the present invention.
[0024] Meanwhile, the bag opening-side pressing member must be able to move between a pressing position at which the bag is pressed in the rear face-side direction of the bag and a standby position that is away from the bag, regardless of whether the rear plate is actually movable or not.

(4) The assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other, the rear plate is provided on the rear face side of the bag, and the pair of pressing members are provided on the bag face side where the print part of the bag is located, and in this structure, the pair of pressing members can be provided with a specific distance apart in the lengthwise direction of the bag on the front side of the bag.

[0025] The rear plate has a flat receiving face that corresponds to the print part of the bag, and it is provided with an opening-side end face and a bag bottom-side end face along the width direction of the bag on the opening side and bag bottom side of the receiving face, respectively. Each one of the pressing members has a pressing component that extends in the width direction of the bag, and when the rear plate and the pair of pressing members come into contact with each other, the pressing components of the pair of pressing members are pushed in beyond the receiving face of the rear plate at positions near the opening-side end face and the bag bottom-side end face of the rear plate.
[0026] The bag at this point is sandwiched, in the width direction of the bag, between one of the pressing components and the opening-side end face and between the other one of the pressing components and the bag bottom-side end face, and is pushed in along with the pressing components in the rear face-side direction of the bag, so that the bag face that includes the print part of the bag is stretched taut along the receiving face of the rear plate.

(5) The assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other, the rear plate is provided on the rear face side of the bag, and the pair of pressing members are provided on the bag face side where the print part of the bag is located; and in this structure, the pair of pressing members can be provided with a specific distance apart in the width direction of the bag on the front side of the bag.

[0027] The rear plate has a flat receiving face that corresponds to the print part of the bag, and it is provided with left and right end faces along the lengthwise direction of the bag on both sides of the receiving face. Each one of the pressing members has a pressing component that extends in the lengthwise direction of the bag, and when the rear plate and the pair of pressing members come into contact with each other, the pressing components are pushed in beyond the receiving face of the rear plate at positions near the left and right end faces.
[0028] The bag at this point is sandwiched, in the lengthwise direction of the bag, between the pressing components and the left and right end faces and is pushed in along with the pressing components in the rear face-side direction of the bag, so that the bag face that includes the print part of the bag is stretched taut along the receiving face of the rear plate.

(6) In the structures (4) and (5) above, the rear plate and the pair of pressing members are moved toward and away from each other. In this case, the relative movement modes thereof can be the same as the modes (a) to (c) described in (3) above.

(7) In the structures (1) to (6) above, the pressing components of the pressing members are formed from a rubber material.

(8) The bag applied to the above-described bag filling and packaging apparatus is, for example, one in which the upper edge of the bag is open; and the bag filling and packaging apparatus is a type in which it grips both sides of the upper edge of the bag with a pair of left and right grippers so that the bag is held in a that it hangs down when carried along the conveyance path. Also, this bag filling and packaging apparatus is an intermittently rotating type bag filling and packaging apparatus in which a plurality of pairs of grippers are equidistantly provided around an intermittently rotating table and moved along a circular conveyance path with the intermittent rotation of the table, and a printing device (or a print inspection device) and an assisting device are provided at a stopping position at which the printing step (or the print-inspection step) is carried out.

[0029] The packaging steps can include both printing step and print-inspection step. In such a structure, the printing is performed at the printing step position, and the print inspection is performed at a suitable stopping position ahead of the bag mouth opening step position (usually the next stopping position after the printing step position); and instead, the printing step and the print-inspection step can be performed at the same stopping position. In the latter case, the printing device and the print inspection device are provided at the same stopping position, and the assisting device is used for both printing assistance and print inspection assistance.

[0030] As seen from the above, in the bag filling and packaging method and bag filling and packaging apparatus according to the present invention, the bag face that includes a print part (which is an area in which printing will be performed or an area in which printing has been performed) is straightened out to be flat prior to the printing or print inspection, accordingly, printing defects or missed problems in print inspection is prevented even if the bag face is previously warped or wavy. Also, since the assisting device merely pulls the bag face taut in the lengthwise direction of the bag or the width direction of the bag, rather than squeezing the bag face all the way around the print part, wrinkling of the bag face is prevented.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0031]

FIG 1 is a side view of the structure of the essential part of an assisting device according to the present invention;

FIG 2 is a front view of the same;

FIGS. 3 through 5 are cross-sectional side views showing the progress of the operation of the assisting device over time;

FIGS. 6 through 8 are cross-sectional side views showing the progress of the operation of another assisting device over time;

FIG 9 is a cross-sectional side view of the structure of yet another assisting device according to the present invention;

FIG 10 is a side view of the structure of yet another assisting device according to the present invention;

FIG 11 is a cross-sectional top view thereof;

FIG 12 is a perspective view of an intermittently rotating bag filling and packaging apparatus to which the assisting device according to the present invention is applied; and

FIGS. 13(a) and 13(b) are cross sectional side views of the structure of a conventional assisting device and a curved bag shape.

DETAILED DESCRIPTION OF THE INVENTION

[0032] The structure and operation of an assisting device (print assisting device or print-inspection assisting device) used particularly in the printing or print-inspection step of the bag filling and packaging method and bag filling and packaging apparatus according to the present invention will now be described with reference to FIGS. 1 to 11. In the following embodiments, this assisting device is provided at a printing step position II of the intermittently rotating bag filling and packaging apparatus shown in FIG 12.

[0033] In FIGS. 1 and 2, the print assisting device includes, among other components, a rear plate 21, a bag bottom-side pressing member 22, a bag opening-side pressing member 23, a drive means (though not shown, it is, for example, an air cylinder) for the rear plate 21, a drive means (air cylinder) 24 for the bag bottom-side pressing member 22 and the bag opening-side pressing member 23. The reference numeral 5 is a printer.

[0034] The rear plate 21 is fixed to the upper end of an attachment plate 25 linked to the drive means. The rear plate 21 is provided on the rear face side of the bag 3 (the bag face side with no print part), and moves back and forth in a direction perpendicular to the bag face of the stopped bag 3 within the horizontal plane, between a standby position that is away from the bag 3 (see FIG 1) and a receiving position at which the bag 3 is held between the rear plate 21 and the bag bottom-side pressing member 22 (see FIG 4). The rear plate 21 has a flat, substantially vertical receiving face 26 that corresponds to the print part of the bags 3 and to the surrounding bag face. A bag bottom-side end face 27 that is substantially horizontal is formed on the lower side (bottom-side of the

bag) of the receiving face 26, and an opening-side end face 28 that is substantially horizontal is formed on the upper side of the receiving face 26 (the bag opening side). The receiving face 26 is formed such that its horizontal width (its length in the bag width direction) is slightly greater than the bag width. FIG 1 shows the up and down direction range of the print part P.

[0035] The bag bottom-side pressing member 22 and the bag opening-side pressing member 23 are provided on the front side of the bag 3 (on the bag face side where the print part of the bag is located), and has plate-like protrusions, namely, pressing components 31 and 32, that extend in the horizontal direction (the width direction of the bag 3) and are spaced apart by a specific distance in the up and down direction (the lengthwise direction of the bag 3). The pressing component 31 is located below (on the bag bottom side) the print part P, and the pressing component 32 is located above (on the bag opening side) the print part P. More specifically, the pressing component 31 is located under and close to the bag bottom-side end face 27 of the rear plate 21, and the pressing component 32 is located above and away from the opening-side end face 28. The vertical spacing between the pressing component 31 and the bag bottom-side end face 27 must be greater than the thickness of the bag 3 and needs to be made as narrow as possible so that the bag can be held sandwiched between the pressing component 31 and the bag bottom-side end face 27 (so that the bag 3 can be held tightly enough so as not readily slip in the direction of force when a force is exerted on the bag 3 in the lengthwise direction). The pressing component 31 and the pressing component 32 are preferably made of rubber, for example, to increase the frictional force with the bags 3, which are composed of a plastic film.

[0036] The proximal components 33 and 34 of the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 are respectively fixed at upper and lower positions of a connecting plate 35, and the connecting plate 35 is fixed to the distal end of a piston rod 36 of the air cylinder 24 (fixed to a stand that is not shown). When the air cylinder 24 is operated, the bag bottom-side pressing member 22 is moved between a standby position (see FIG 1) away from the bag 3 and a holding position (see FIG 5) at which the bag 3 is held between the rear plate 21 and the bag bottom-side pressing member 22, and the bag opening-side pressing member 23 is moved between a standby position (see FIG 1) away from the bag 3 and a pressing position (see FIG 5) at which the bag 3 is pressed in its rear face-side direction (perpendicular to the bag face), wherein each of these members is moved back and forth simultaneously within the horizontal plane and in a direction perpendicular to the bag face of the stopped bag 3.

[0037] Next, the operation of this print assisting device will be described with reference to FIGS. 3 to 5. FIG 3 shows the state when an empty bag 3 is clamped between the grippers 2, conveyed to the printing step position II, and is stopped at the printing step position II. At this point, the rear plate 21, the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 are in the standby position. The bag 3 curves in the lengthwise direction (the up and down direction).

[0038] Then, a drive means (not shown) of the rear plate 21 and the air cylinder 24 are operated, so that the rear plate 21 is moved toward the receiving position, the bag bottom-side pressing member 22 is moved toward the holding position, and the bag opening-side pressing member 23 is moved toward the pressing position.

[0039] FIG 4 shows the state when the rear plate 21 is reached and stopped at the receiving position, wherein the print part P and nearby bag face of the bag 3 are located at the position of the receiving face 26 of the rear plate 21. At this point, the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 are just about to arrive at the holding position or pressing position, respectively. The distal end of the pressing component 31 of the bag bottom-side pressing member 22 goes beyond the position of the receiving face 26 of the rear plate 21, and the position of the bag 3 below the receiving face 26 (more toward the bag bottom side from the print part P) is sandwiched in the width direction of the bag 3 between the distal end of the pressing component 31 and the bag bottom-side end face 27 of the rear plate 21. At the same time, the distal end of the pressing component 32 of the bag opening-side pressing member 23 also goes beyond the receiving face 26 of the rear plate 21, and the position of the bag 3 above the receiving face 26 (more toward the opening side from the print part P) is about to be pushed in the rear face-side direction of the bag 3.

[0040] Until the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 go from the state in FIG 4 and reach the holding position or the pressing position, respectively, the bag 3 is in a state of being sandwiched between the pressing component 31 and the bag bottom-side end face 27 at a position below the rear plate 21, and at a position above the rear plate 21, as the bag 3 is moved toward the pressing position of the pressing component 32, the bag 3 is pulled in the movement direction of the pressing component 32. If the space between the pressing component 31 and the bag bottom-side end face 27 is small enough, and the coefficient of friction of the bag bottom-side end face 27 and the pressing component 31 is not low, then the sandwiched bag 3 will be held at this position (the bag face will not slide up or down). On the other hand, when the pressing component 31 is, in particular, composed of rubber or the like and has a higher coefficient of friction than the rear plate 21 made of, for example, plastic, then as the pressing component 31 is moved to the holding position, the place where the bag 3 is sandwiched will be pushed in the movement direction of the pressing component 31.

[0041] FIG 5 shows the state when the bag bottom-side pressing member 22 and the bag opening-side

pressing member 23 have respectively reached the holding position or the pressing position. The bag 3 is held such that the position in the lower portion of the receiving face 26 (the bag bottom side from the print part P) is sandwiched between the pressing component 31 of the bag bottom-side pressing member 22 and the bag bottom-side end face 27 of the rear plate 21, while the position in the upper portion of the receiving face 26 (the opening side from the print part P) is pushed in to the rear of the receiving face 26 (in the rear face-side direction of the bag 3), so that the bag face of the bag 3 including the print part P is held flat in a taut state over the receiving face 26.

[0042] In this state, the printer 5 is operated and printing is performed on the print part P of the bag.

[0043] After the above-described operations, a drive means (not shown) of the rear plate 21 and the air cylinder 24 are operated, so that the rear plate 21 and the pair of pressing members 22 and 23 are moved back to their original standby position. Then, the bag 3 that has been undergone the printing step is conveyed toward the next stopping position III (bag mouth opening step position), and a new bag 3 is conveyed from the stopping position I (bag feeding step position) to the stopping position II (printing step position).

[0044] FIGS. 6 to 8 illustrate another print assisting device and its operation. This assisting device differs from the assisting device shown in FIGS. 1 to 5 in that the rear plate 21 is fixed at the receiving position, the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 each have their own independent drive means (air cylinders 24 and 37), and when the bag bottom-side pressing member 22 is moved to the holding position, the pressing component 31 comes into contact with the receiving face 26 of the rear plate 21.

[0045] FIG 6 shows the state when the bag 3 is clamped by the grippers 2 and conveyed to the printing step position II, and stopped at said position. At this point, the rear plate 21 is in the receiving position, and the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 are both in the standby position. The bag 3 is curved in the lengthwise direction (up and down direction). The receiving position must be set so that the rear plate 21 does not interfere with a bag 3 that is being conveyed in.

[0046] FIG 7 shows the state when the air cylinder 24 is operated and the bag bottom-side pressing member 22 is reached the holding position. In this holding position, the distal end of the pressing component 31 is in contact with the receiving face 26 of the rear plate 21, the lower position of the bag 3 from the print part P (the position on the bag bottom side) is sandwiched between the receiving face 26 and the pressing component 31, and the bag 3 is held in this position.

[0047] The air cylinder 37 is then operated, and the bag opening-side pressing member 23 is moved to the pressing position. FIG 8 shows the state when the bag opening-side pressing member 23 is reached the pressing position, in which the position of the bag 3 above the receiving face 26 (the opening side from the print part P) is pushed in by the pressing component 32 to the rear of the receiving face 26 (the rear face-side direction of the bag 3). Consequently, the bag face of the bag 3 including the print part P is held flat in a taut state over the receiving face 26, and in this state the printer 5 is operate and printing is performed on the print part P.

[0048] After this, the air cylinders 24 and 37 are operated and the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 are moved back to their original standby positions. Then, the bag 3 that has been undergone the printing step is conveyed to the next stopping position III (bag mouth opening step position), and a new bag 3 is conveyed from the stopping position I (bag feeding step position) to the stopping position II (printing step position).

[0049] FIG 9 illustrates yet another print assisting device and its operation. This print assisting device differs from the print assisting device shown in FIGS. 1 to 5 in that both the pressing component 31 of the bag bottom-side pressing member 22 and the pressing component 32 of the bag opening-side pressing member 23 are provided under and close to the bag bottom-side end face 27 of the rear plate 21, or above and in close proximity to the opening-side end face 28 of the rear plate 21, respectively.

[0050] In this print assisting device, the distal ends of the pressing components 31 and 32 of the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 go beyond the position of the receiving face 26 of the rear plate 21 just before the pressing members 22 and 23 reach the pressing position shown in FIG 9, and the positions of the bag 3 above and below the receiving face 26 are sandwiched in the width direction of the bag 3 between the distal ends of the pressing components 31 and 32 and the bag bottom-side end face 27 or the opening-side end face 28 of the rear plate 21.

[0051] Then, up until the bag bottom-side pressing member 22 and the bag opening-side pressing member 23 reach the pressing position, the bag 3 is kept in a state that it is sandwiched between the pressing component 31 and the bag bottom-side end face 27 at the lower position of the rear plate 21 and between the pressing component 32 and the opening-side end face 28 at the upper position of the rear plate 21.If the gap between the bag bottom-side end face 27 of the rear plate 21 and the pressing component 31 and the gap between the opening-side end face 28 of the rear plate 21 and the pressing component 32 are small enough, and the pressing components 31 and 32 are made of rubber or another such material with a high coefficient of friction, then as the pressing components 31 and 32 are moved to the pressing position, the places of the bag 3 that are sandwiched are pushed in the movement direction of the pressing components 31 and 32. Consequently, the bag face of the bag 3 including the print part P is held flat and taut

over the receiving face 26.

[0052] In this state, the printer 5 is operated and printing is performed on the print part P of the bag.

[0053] FIGS. 10 and 11 illustrate yet another print assisting device and its operation. This print assisting device is the same as the print assisting device described above in terms of the structure that includes a pair of pressing members 22 and 23 and a rear plate 21 that are provided so as to face each other and moved toward and away from each other; however, it differs in that the width of the rear plate 21 (the width of the receiving face 26) is considerably less than the bag's width, that left and right end faces 38 and 39 are provided along the lengthwise direction of the bag 3 on both sides of the receiving face 26, and that the pressing members 22 and 23 are provided a specific distance apart in the width direction of the bag 3 (a gap that is somewhat larger than the width of the receiving face 26) and each one of these have pressing components 31 and 32 extends in the lengthwise direction of the bag 3.

[0054] More specifically, the rear plate 21 is moved back and forth in a direction perpendicular to the bag face of the bag 3 within a horizontal plane, between a standby position that is away from the bag 3 (see FIG 10) and a front receiving position (see FIG 11) by a drive means such as air cylinder (not shown). The pressing components 31 and 32 are moved back and forth in a direction perpendicular to the bag face of the bag 3 within a horizontal plane, between a standby position that is away from the bag 3 (see FIG 10) and a front pressing position (see FIG 11).

[0055] When the rear plate 21 and the pressing members 22 and 23 are moved from the standby position to the receiving position or the pressing position, as shown in FIG 11, the pressing components 31 and 32 are pushed in on the outside of the end faces 38 and 39 of the rear plate 21, and the gap between the pressing components 31 and 32 and the end faces 38 and 39 of the rear plate 21 at this point is greater than the thickness of the bag 3, but is still set to be extremely narrow. This gap is the same as that of the print assisting device shown in FIG 9.

[0056] Therefore, like in the print assisting device shown in FIG 9, as the pressing components 31 and 32 are moved to the pressing position, positions of the bag 3 that are on the left and right of the rear plate 21 are sandwiched between the end face 39 and the pressing component 32 and between the end face 38 and the pressing component 31 in the lengthwise direction of the bag 3, and are pushed in the movement direction of the pressing components 31 and 32 (the rear face-side of the bag 3) while still in this sandwiched state. Consequently, the bag face of the bag 3 that includes the print part P is held flat and taut in the bag width direction over the receiving face 26.

[0057] According to the above-described print assisting devices of the present invention, the following further advantages are obtained:

(1) In the assisting device in FIGS. 1 to 5, since the drive means (air cylinder) of the pair of the pressing members are shared, the device is more compact, its cost is reduced, and the print part of the bag is made taut more efficiently.

(2) With the pressing components of the pressing members made from a rubber material, the friction of the pressing members with the bag (plastic) increases, so that the bag face is less likely to slip when the bag is sandwiched between the pressing components and the rear plate, and a better taut action is obtained.

(3) The drive means is constituted by an air cylinder; accordingly, the pressure of the air supplied to the air cylinder can be adjusted so as to absorb the bag's rebound (so that excessive tension is not exerted on the bag when the bag is pulled taut), which means that there will be less damage to the bags during pressing.

[0058] In addition, the assisting device (print assisting device or and/or print-inspection assisting device) according to the present invention is not limited to the examples described above, and various modifications are possible as follows:

(1) The assisting devices above are described as to assisting devices for a printing step; however, they are applicable in exactly the same way to a print-inspection step. For instance, when print inspection is carried out at the stopping position prior to the bag mouth opening step, a print inspection device and a print-inspection assisting device are provided at that stopping position. This includes a case in which printing is performed at a printing step position and print inspection is performed at a suitable stopping position prior to the bag mouth opening step position (usually, the next stopping position after the printing step position is selected), in which case the printing device and the print assisting device are provided at the printing step position, and the print inspection device and the print-inspection assisting device are provided at the print-inspection step position. Also, the printing step and the print-inspection step can be performed at the same position, in which case the printing device, the print inspection device, and the assisting device (one that is used for both printing assistance and print inspection assistance) are provided at this position.

(2) So as to meet the case in which the position of the print part of the bag is changed, it is preferable for the rear plate, the pressing members, the pressing components, and so forth to be adjustable for position.

(3) The present invention further includes structures in which the bottom side of the bag is sandwiched by a chuck provided at the printing step position or the print-inspection step position and is pulled toward

the bag bottom side (downward); and the bag face is pulled taut in the lengthwise direction of the bag between grippers on the opening side, and in which both sides of the print part of the bag (both edges) are sandwiched by a pair of chucks provided so as to face each other at the printing step position or the print-inspection step position and pulled to the left and right, the bag face is pulled taut in the width direction of the bag between these two chucks, and then printing, print inspection, or the like is performed.

(4) In the above examples, the present invention is described with reference to an intermittently rotating type bag filling and packaging apparatus in which an ordinary bag is carried along a circular conveyance path with the opening (mouth) of the bag facing up, and various packaging steps are carried out sequentially in the course of the steps therein.

[0059] Nonetheless, the present invention is further applicable to a packaging apparatus that includes a racetrack-shaped conveyance path or a linear conveyance path, and it can be generally applied to, for instance, an intermittent conveyance type vertical bag filling and packaging apparatus (a type in which various packaging actions are performed in a state that bags clamped by grippers are held with its mouth facing up), a continuous conveyance type bag filling and packaging apparatus (a type in which bags are conveyed continuously), and a lateral bag filling and packaging apparatus (a type in which various packaging actions are performed in a state that the bag mouths are facing sideways while bags are being conveyed), and the invention can be further applicable to a bag filling and packaging apparatus in which the contents are put into a bag that has a spout as its opening (wherein instead of conveying bags with both side edges held by grippers, the spout of each bags is held in the groove of a spout holding member). In the case of continuous conveyance type apparatus, the assisting device itself is moved to follow the movement of the bag, and after the completion of printing or print inspection, the assisting device is returned to its original position.

Claims

1. A bag filling and packaging method in which an open end of a bag is held while the bag is carried along a conveyance path, and packaging steps including filling the bag with its contents and closing up an opening thereof are sequentially carried out while the bag is being conveyed, wherein
a printing step is performed before the content-filling step as one of the packaging steps, and
in the printing step a bag face that includes a print part is pulled taut in at least one of a length direction and a width direction of the bag, and then printing is performed with the print part of the bag being flat.

2. A bag filling and packaging method in which an open end of a bag is held while the bag is carried along a conveyance path, and packaging steps including filling the bag with its contents and closing up an opening thereof are sequentially carried out while the bag is being conveyed, wherein
a print-inspection step of a bag face of the bag is performed before the content-filling step as one of the packaging steps, and
in the print-inspection step a bag face that includes a print part is pulled taut in at least one of a length direction and a width direction of the bag, so that print inspection is performed with the print part of the bag being flat.

3. The bag filling and packaging method according to Claim 1 or 2, wherein
an upper edge of the bag is open, and
both sides of the upper edge of the bag are gripped by a pair of left and right grippers so that the bag is held in a state in which the bag hangs down when carried along the conveyance path.

4. A bag filling and packaging apparatus wherein an open end of a bag is held while the bag is carried along a conveyance path, and packaging steps including filling the bag with its contents and closing up an opening thereof are sequentially carried out while the bag is being conveyed, and wherein
a printing step is performed before the content-filling step as part of the packaging steps, and
at a position where the printing step is performed, a printing device and a print assisting device are provided, said print assisting device pulling taut a bag face that includes a print part in one of a length direction and a width direction of the bag, and then printing is performed with the print part of the bag being flat.

5. A bag filling and packaging apparatus wherein an open end of a bag is held while the bag is carried along a conveyance path, and packaging steps including filling the bag with its contents and closing up an opening thereof are sequentially carried out while the bag is being conveyed, and wherein
a print-inspection step is performed before the content-filling step as one of the packaging steps, and
at a position where the print-inspection step is performed, a print inspection device and a print-inspection assisting device are provided, said print-inspection assisting device pulling taut a bag face that includes a print part of the bag in at least one of a length direction and a width direction of the bag, and then printing is performed with the print part of the bag being flat.

6. The bag filling and packaging apparatus according to Claim 4, wherein

the print assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other;
the rear plate is provided on a rear face side of the bag and has a flat receiving face that corresponds to the print part of the bag;
the pair of pressing members comprise a bag bottom-side pressing member and a bag opening-side pressing member provided a specific distance apart in the lengthwise direction of the bag on a front side of the bag where the print part is located;
each one of the pressing members has a pressing component that extends in the width direction of the bag;
the rear plate and the pressing component of the bag bottom-side pressing member sandwich a position on a bag bottom side, in the width direction of the bag, from the print part of the bag so as to hold the bag;
the pressing component of the bag opening-side pressing member presses a position that is on the opening side of the bag from the receiving face of the rear plate in the rear face-side direction; and
the pressing component of the bag opening-side pressing member is pushed in beyond the receiving face of the rear plate in the rear face-side direction of the bag with the bag being held by the rear plate and the pressing component of the bag bottom-side pressing member.

7. The bag filling and packaging apparatus according to Claim 5, wherein
the print-inspection assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other;
the rear plate is provided on a rear face side of the bag and has a flat receiving face that corresponds to the print part of the bag;
the pair of pressing members comprise a bag bottom-side pressing member and a bag opening-side pressing member provided a specific distance apart in the lengthwise direction of the bag on the front side of the bag where the print part of the bag is located;
each one the pressing members has a pressing component that extends in the width direction of the bag;
the rear plate and the pressing component of the bag bottom-side pressing member sandwich a position on the bag bottom side, in the width direction of the bag, from the print part of the bag so as to hold the bag;
the pressing component of the bag opening-side pressing member presses a position that is on the opening side from the receiving face of the bag in the rear face-side direction; and
the pressing component of the bag opening-side pressing member is pushed in beyond the receiving face of the rear plate in the rear face-side direction of the bag with the bag being held by the rear plate and the pressing component of the bag bottom-side pressing member.

8. The bag filling and packaging apparatus according to Claim 6, wherein
the rear plate and bag bottom-side pressing member of the print assisting device are set up in one of the manners consisting of:

the rear plate is provided at a receiving position that is a fixed position and the bag bottom-side pressing member is movable between a standby position away from the bag and a holding position at which the bag is held between the rear plate and the bag bottom-side pressing member,
the bag bottom-side pressing member is provided at a holding position that is a fixed position and the rear plate is movable between a standby position away from the bag and a receiving position at which the bag is held between the bag bottom-side pressing member and this rear plate, and
the bag bottom-side pressing member is movable between a standby position away from the bag and a holding position at which the bag is held between the rear plate and the bag bottom-side pressing member and the rear plate is movable between a standby position away from the bag and a receiving position at which the bag is held between the bag bottom-side pressing member and this rear plate; and wherein

furthermore, the bag opening-side pressing member is movable between a standby position away from the bag and a pressing position at which the bag is pressed in the rear face-side direction.

9. The bag filling and packaging apparatus according to Claim 7, wherein
the rear plate and bag bottom-side pressing member of the print-inspection assisting device are set up in one of the manners consisting of:

the rear plate is provided at a receiving position that is a fixed position and the bag bottom-side pressing member is movable between a standby position away from the bag and a holding position at which the bag is held between the rear plate and the bag bottom-side pressing member,
the bag bottom-side pressing member is provided at a holding position that is a fixed position and the rear plate is movable between a standby position away from the bag and a receiving po-

sition at which the bag is held between the bag bottom-side pressing member and the rear plate, and

the bag bottom-side pressing member is movable between a standby position away from the bag and a holding position at which the bag is held between the rear plate and the bag bottom-side pressing member and the rear plate is movable between a standby position away from the bag and a receiving position at which the bag is held between the bag bottom-side pressing member and the rear plate; and

the bag opening-side pressing member is movable between a standby position away from the bag and a pressing position at which the bag is pressed in the rear face-side direction.

10. The bag filling and packaging apparatus according to Claim 6 or 8, wherein the bag is held between the receiving face of the rear plate and the pressing component of the bag bottom-side pressing member.

11. The bag filling and packaging apparatus according to Claim 7 or 9, wherein the bag is held between the receiving face of the rear plate and the pressing component of the bag bottom-side pressing member.

12. The bag filling and packaging apparatus according to Claim 6 or 8, wherein

the rear plate has a bag bottom-side end face on the bag bottom side of the receiving face, and

the bag is held between the bag bottom-side end face and the pressing component of the bag bottom-side pressing member.

13. The bag filling and packaging apparatus according to Claim 7 or 9, wherein

the rear plate has a bag bottom-side end face on the bag bottom side of the receiving face, and

the bag is held between the bag bottom-side end face and the pressing component of the bag bottom-side pressing member.

14. The bag filling and packaging apparatus according to Claim 4, wherein

the print assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other,

the rear plate is provided on a rear face side of the bag, has a flat receiving face that corresponds to the print part of the bag, and has an opening-side end face and a bag bottom-side end face along the width direction of the bag on the opening side and bag bottom side of the receiving face, respectively, and

the pair of pressing members are provided a specific distance apart in the lengthwise direction of the bag on the front side of the bag where the print part is located, each one of the pressing members having a pressing component that extends in the width direction of the bag; and wherein

when the rear plate and the pair of pressing members approach each other,

the pressing components of the pair of pressing members are pushed in beyond the receiving face of the rear plate at positions near the opening-side end face and the bag bottom-side end face of the rear plate,

the bag is sandwiched between one of the pressing components and the opening-side end face and between the other one of the pressing components and the bag bottom-side end face in the width direction of the bag, and

the bag is pushed in along with the pressing components in the rear face-side direction of the bag.

15. The bag filling and packaging apparatus according to Claim 5, wherein

the print-inspection assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other,

the rear plate is provided on a rear face side of the bag, has a flat receiving face that corresponds to the print part of the bag, and has an opening-side end face and a bag bottom-side end face along the width direction of the bag on the opening side and bag bottom side of the receiving face, respectively, and

the pair of pressing members are provided a specific distance apart in the lengthwise direction of the bag on the front side of the bag where the print part is located, each one of the pressing members having a pressing component that extends in the width direction of the bag; and wherein

when the rear plate and the pair of pressing members approach each other,

the pressing components of the pair of pressing members are pushed in beyond the receiving face of the rear plate at positions near the opening-side end face and the bag bottom-side end face of the rear plate,

the bag is sandwiched between one of the pressing components and the opening-side end face and between the other one of the pressing components and the bag bottom-side end face in the width direction of the bag, and

the bag is pushed in along with the pressing components in the rear face-side direction of the bag.

16. The bag filling and packaging apparatus according to Claim 4, wherein

the print assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other,

the rear plate is provided on a rear face side of the bag, has a flat receiving face that corresponds to the print part of the bag, and has left and right end faces along the lengthwise direction of the bag on both sides of the receiving face of the rear plate, and
the pair of pressing members are provided a specific distance apart in the width direction of the bag on the front side of the bag where the print part is located, each one of the pressing members having a pressing component that extends in the lengthwise direction of the bag; and wherein
when the rear plate and the pair of pressing members approach each other,
the pressing components of the pair of pressing members are pushed in beyond the receiving face of the rear plate at positions near the left and right end faces,
the bag is sandwiched between the pressing components and the left and right end faces in the lengthwise direction of the bag, and
the bag is pushed in along with the pressing components in the rear face-side direction of the bag.

17. The bag filling and packaging apparatus according to Claim 5, wherein
the print-inspection assisting device comprises a pair of pressing members and a rear plate which are provided to face each other and moved toward and away from each other,
the rear plate is provided on a rear face side of the bag, has a flat receiving face that corresponds to the print part of the bag, and has left and right end faces along the lengthwise direction of the bag on both sides of the receiving face,
the pair of pressing members are provided a specific distance apart in the width direction of the bag on the front side of the bag where the print part is located, each one of the pressing members having a pressing component that extends in the lengthwise direction of the bag; and wherein
when the rear plate and the pair of pressing members approach each other,
the pressing components of the pair of pressing members are pushed in beyond the receiving face of the rear plate at positions near the left and right end faces,
the bag is sandwiched between the pressing components and the left and right end faces in the lengthwise direction of the bag, and
the bag is pushed in along with the pressing components in the rear face-side direction of the bag.

18. The bag filling and packaging apparatus according to any one of Claims 6, 8, 10, 12, 14, and 16, wherein the pressing components of the pressing members are formed from a rubber material.

19. The bag filling and packaging apparatus according to any one of Claims 7, 9, 11, 13, 15, and 17, wherein the pressing components of the pressing members are formed from a rubber material.

20. The bag filling and packaging apparatus according to any one of Claims 4, 6, 8, 10, 12, 14, 16, and 18, wherein
an upper edge of the bag is open,
the bag filling and packaging apparatus grips both sides of the upper edge of the bag with a pair of left and right grippers so that the bag is held to hang down when carried along the conveyance path, and
the bag filling and packaging apparatus is an intermittently rotating type bag filling and packaging apparatus in which a plurality of pairs of grippers are equidistantly provided around an intermittently rotating table, the grippers are moved along a circular conveyance path as the table intermittently rotates, and the printing device and the print assisting device are provided at a stopping position where the printing step is carried out.

21. The bag filling and packaging apparatus according to any one of Claims 5, 7, 9, 11, 13, 15, 17, and 19, wherein
an upper edge of the bag is open,
the bag filling and packaging apparatus grips both sides of the upper edge of the bag with a pair of left and right grippers so that the bag is held to hang down when carried along the conveyance path, and
the bag filling and packaging apparatus is an intermittently rotating type bag filling and packaging apparatus in which a plurality of pairs of grippers are equidistantly provided around an intermittently rotating table, the grippers are moved along a circular conveyance path as the table intermittently rotates, and the print inspection device and the print-inspection assisting device are provided at a stopping position where the print-inspection step is carried out.

FIG. 1

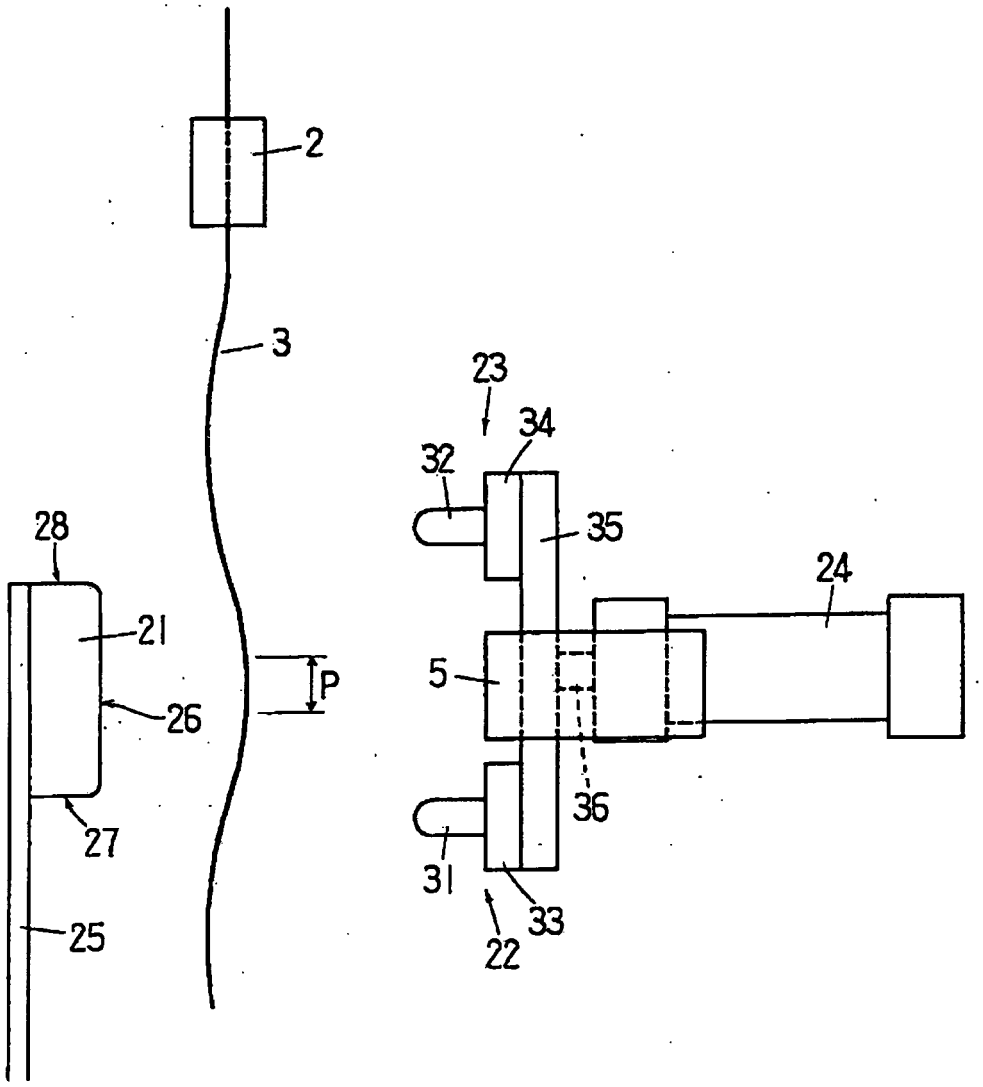


FIG. 2

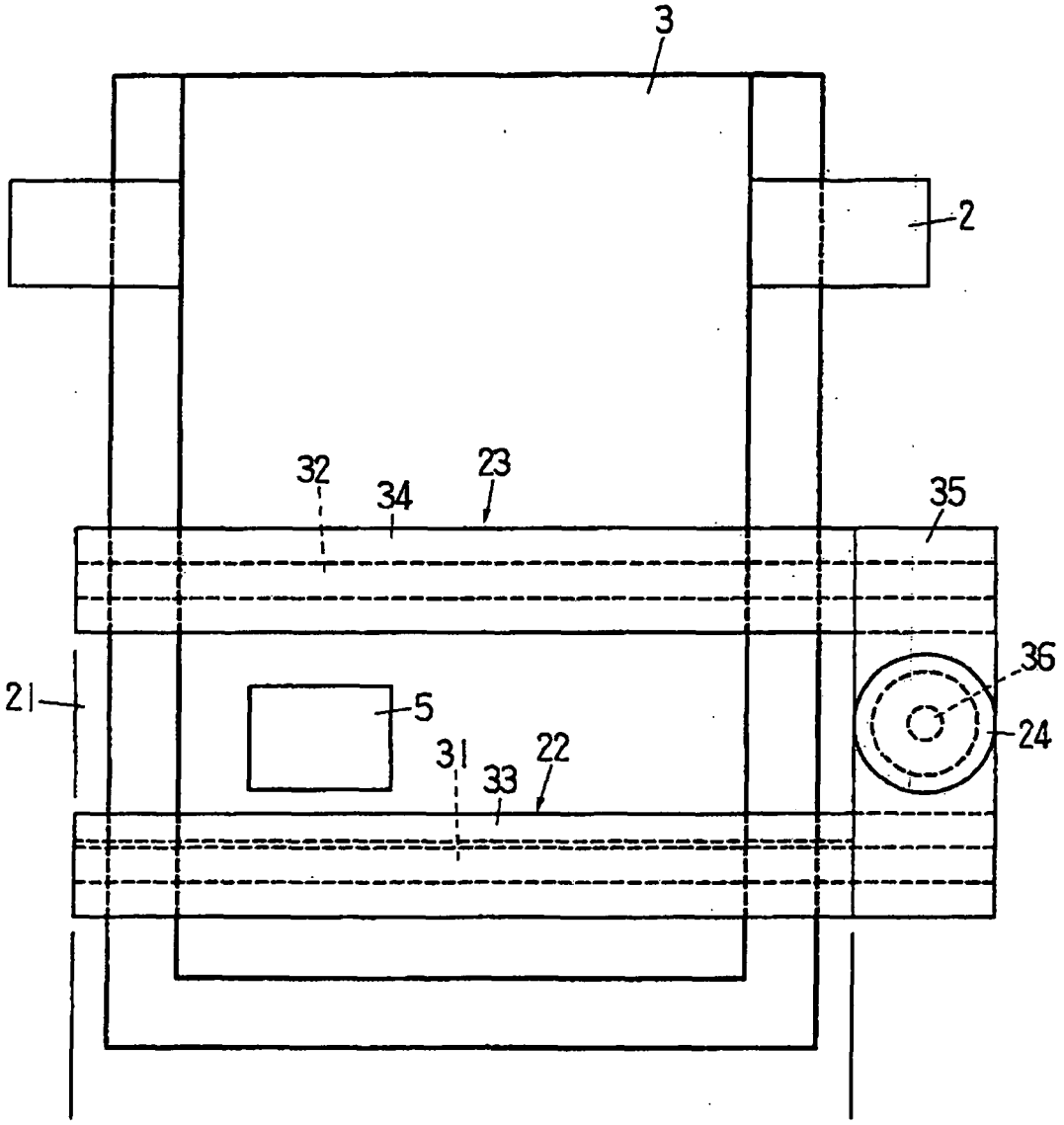


FIG. 3

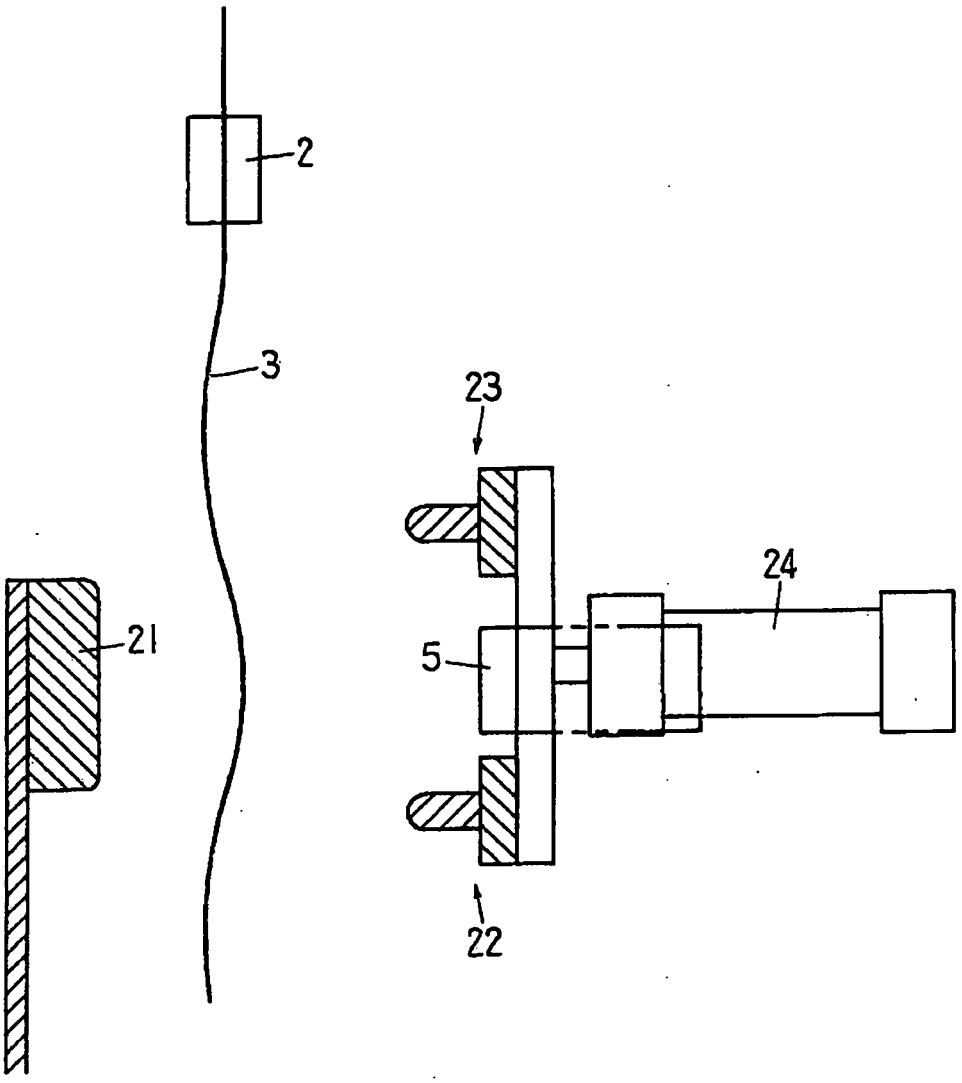


FIG. 4

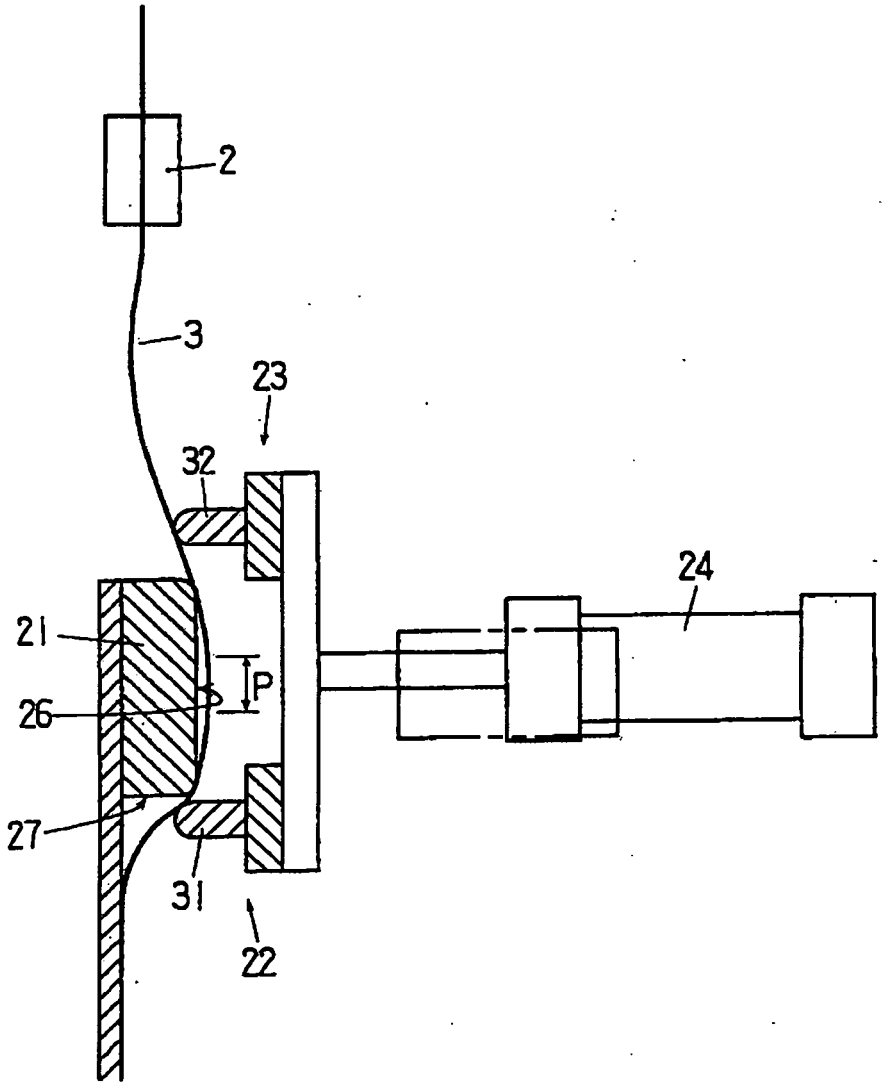


FIG. 5

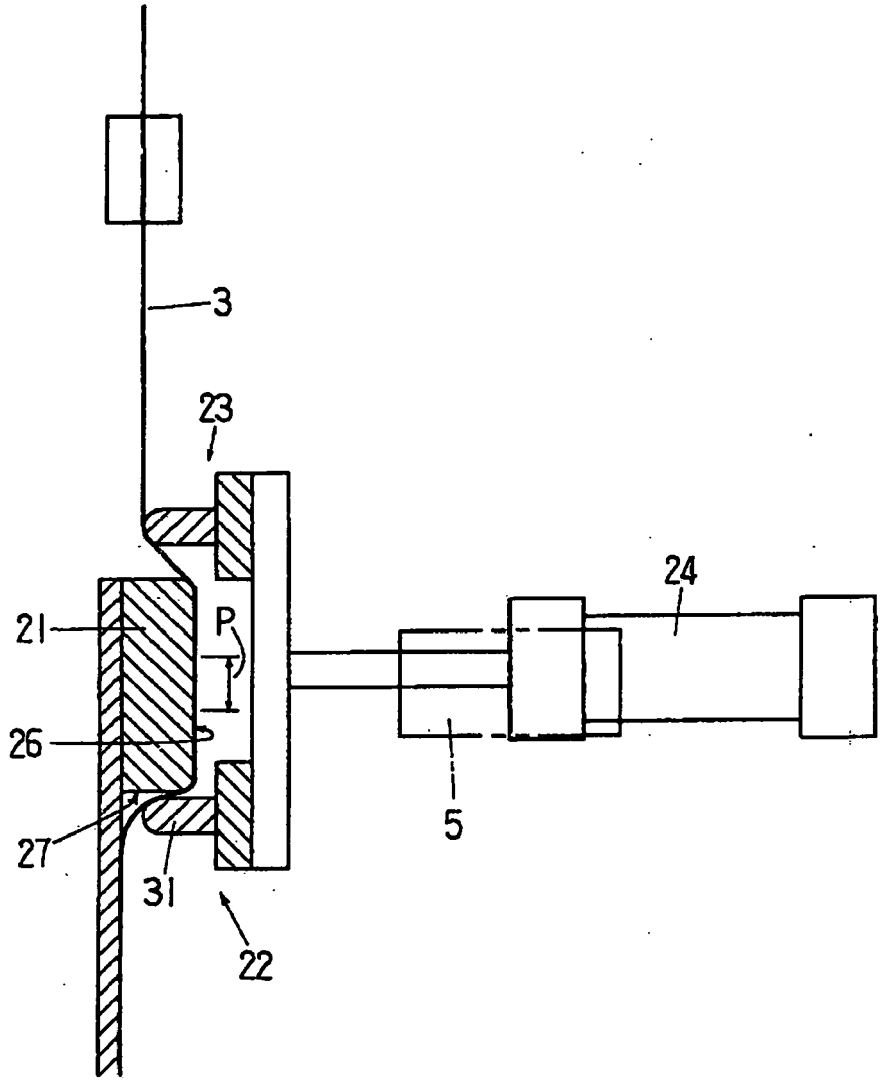


FIG. 6

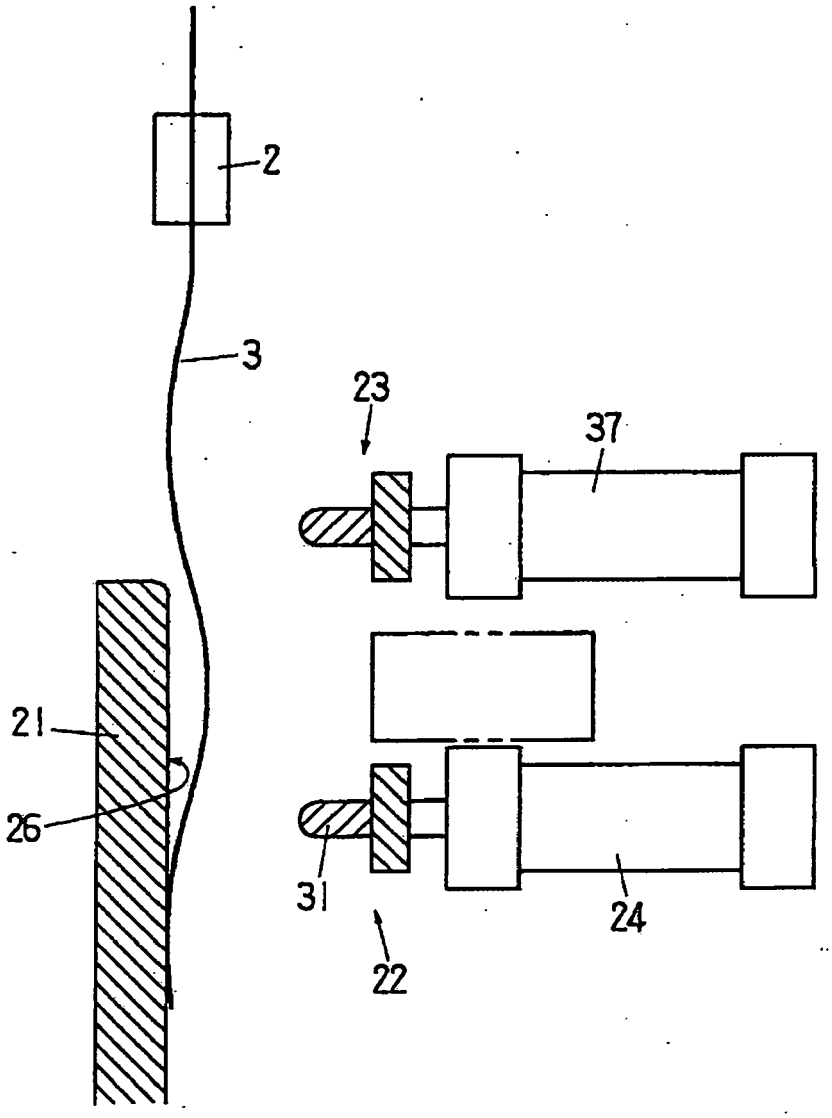


FIG. 7

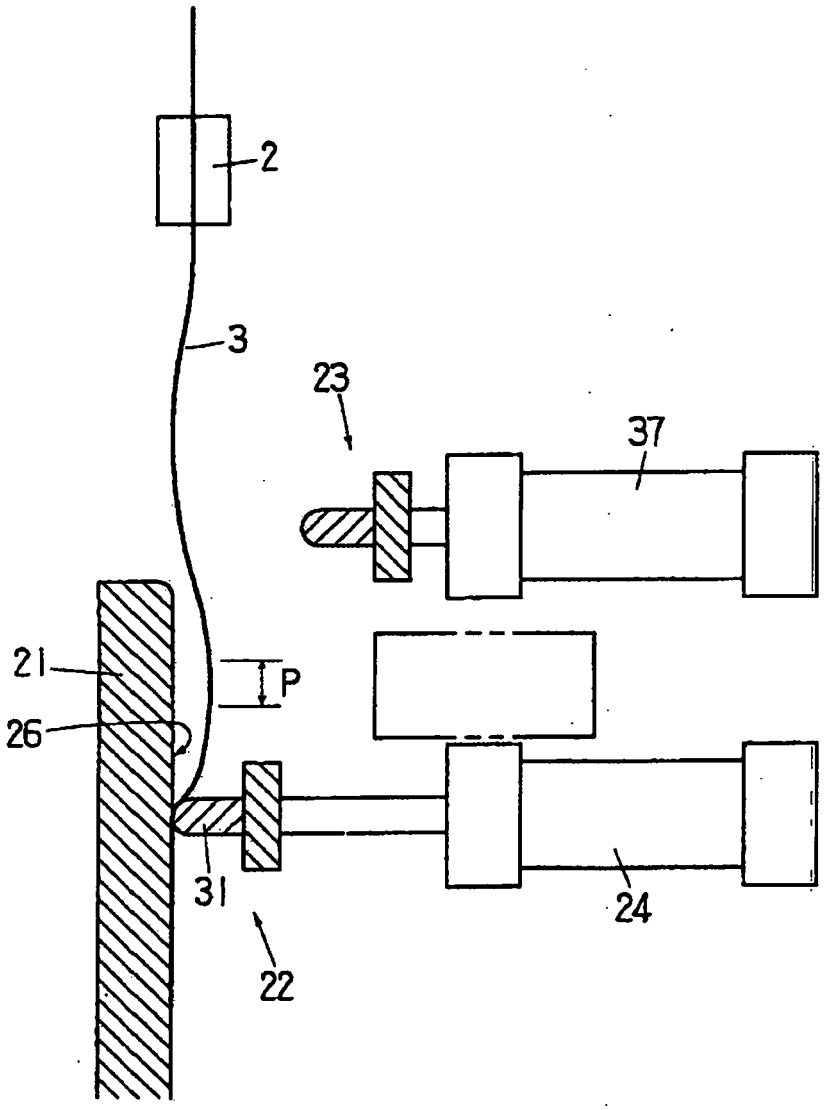


FIG. 8

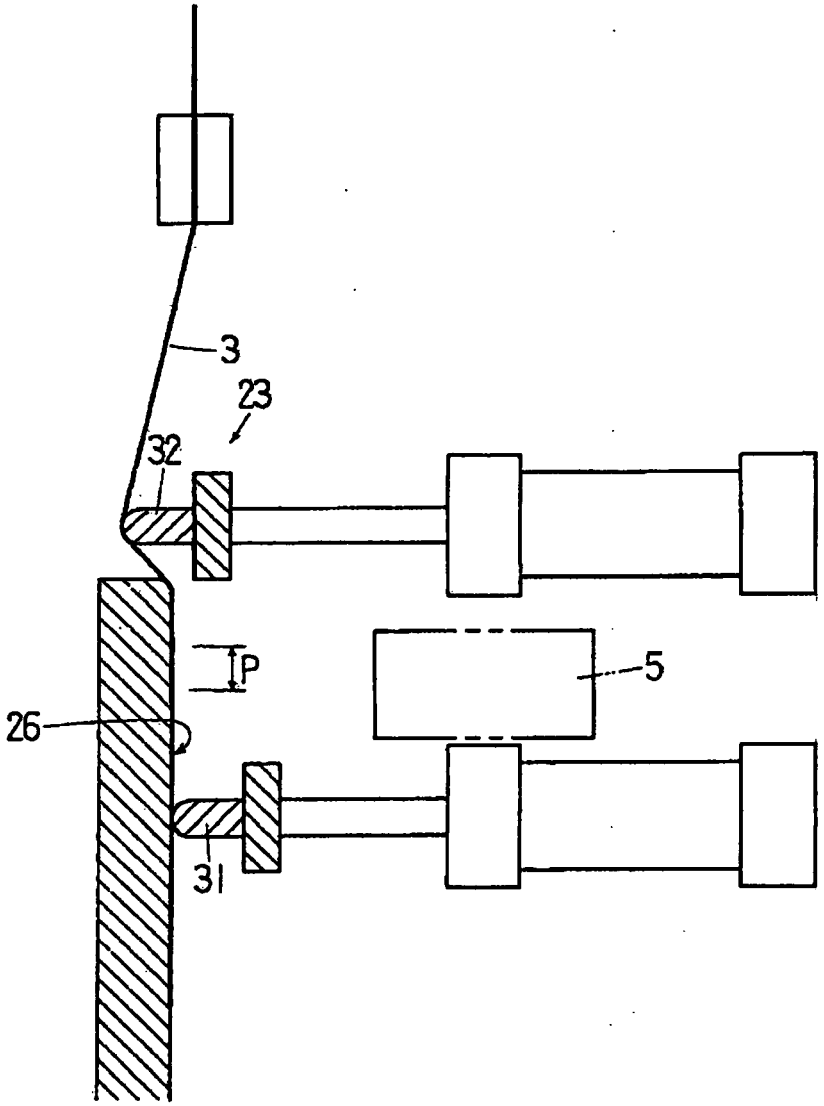


FIG. 9

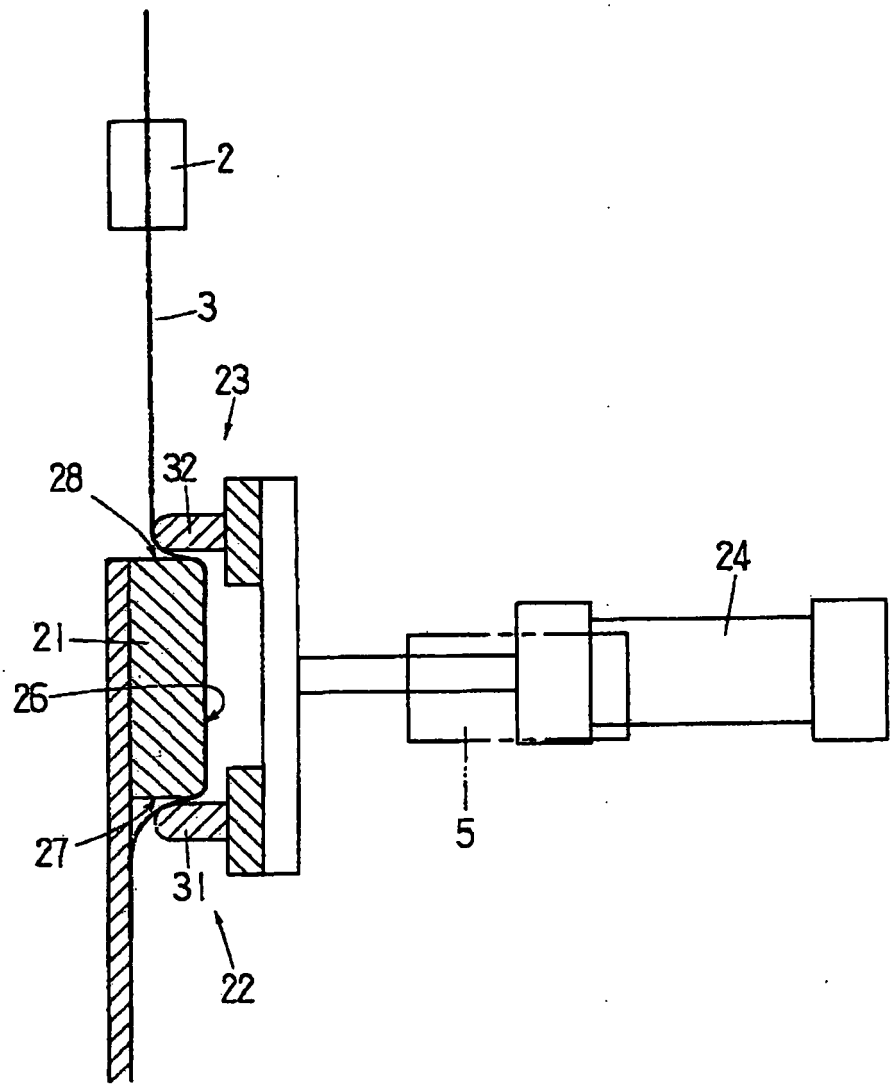


FIG. 10

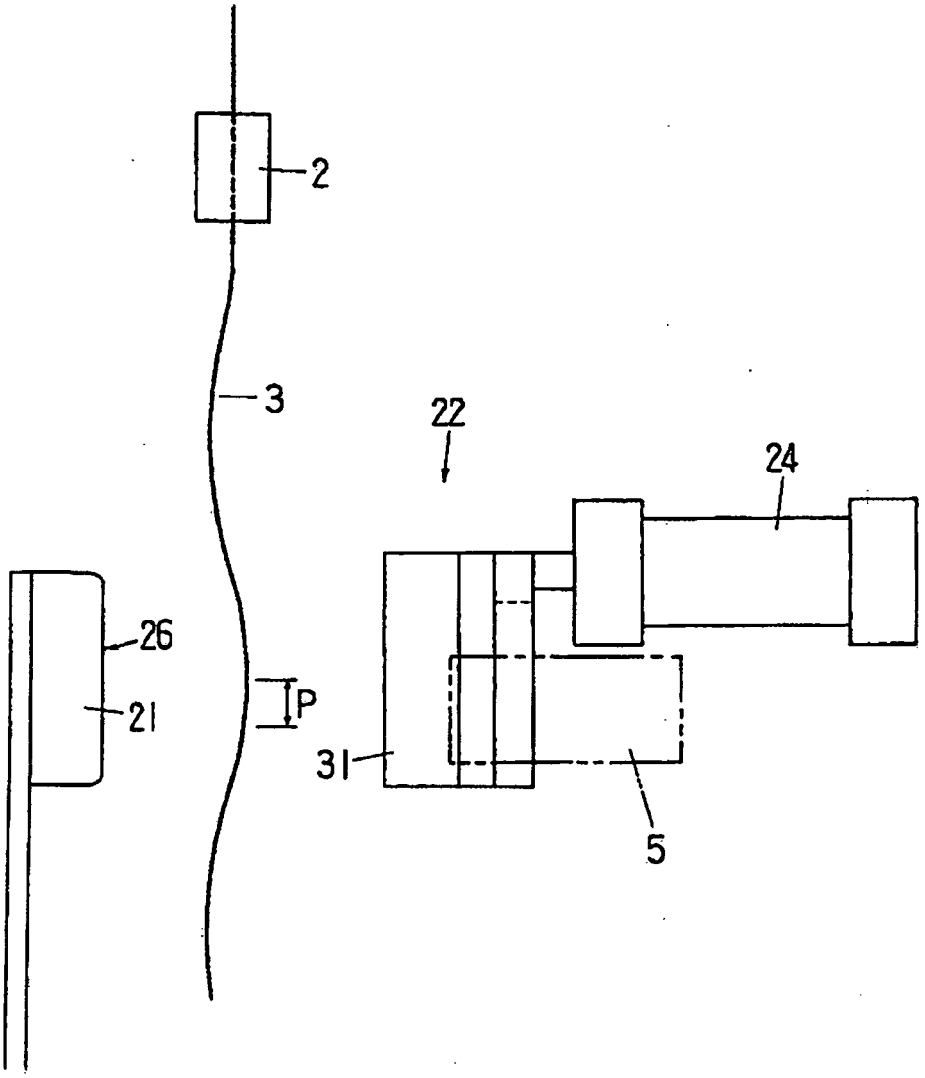


FIG. 11

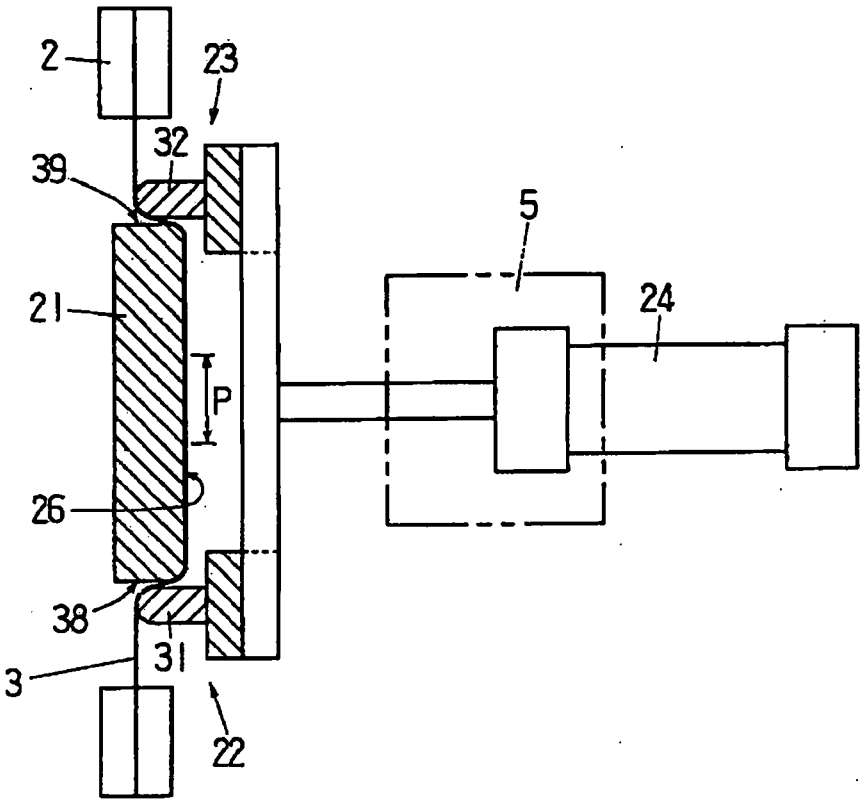


FIG. 12

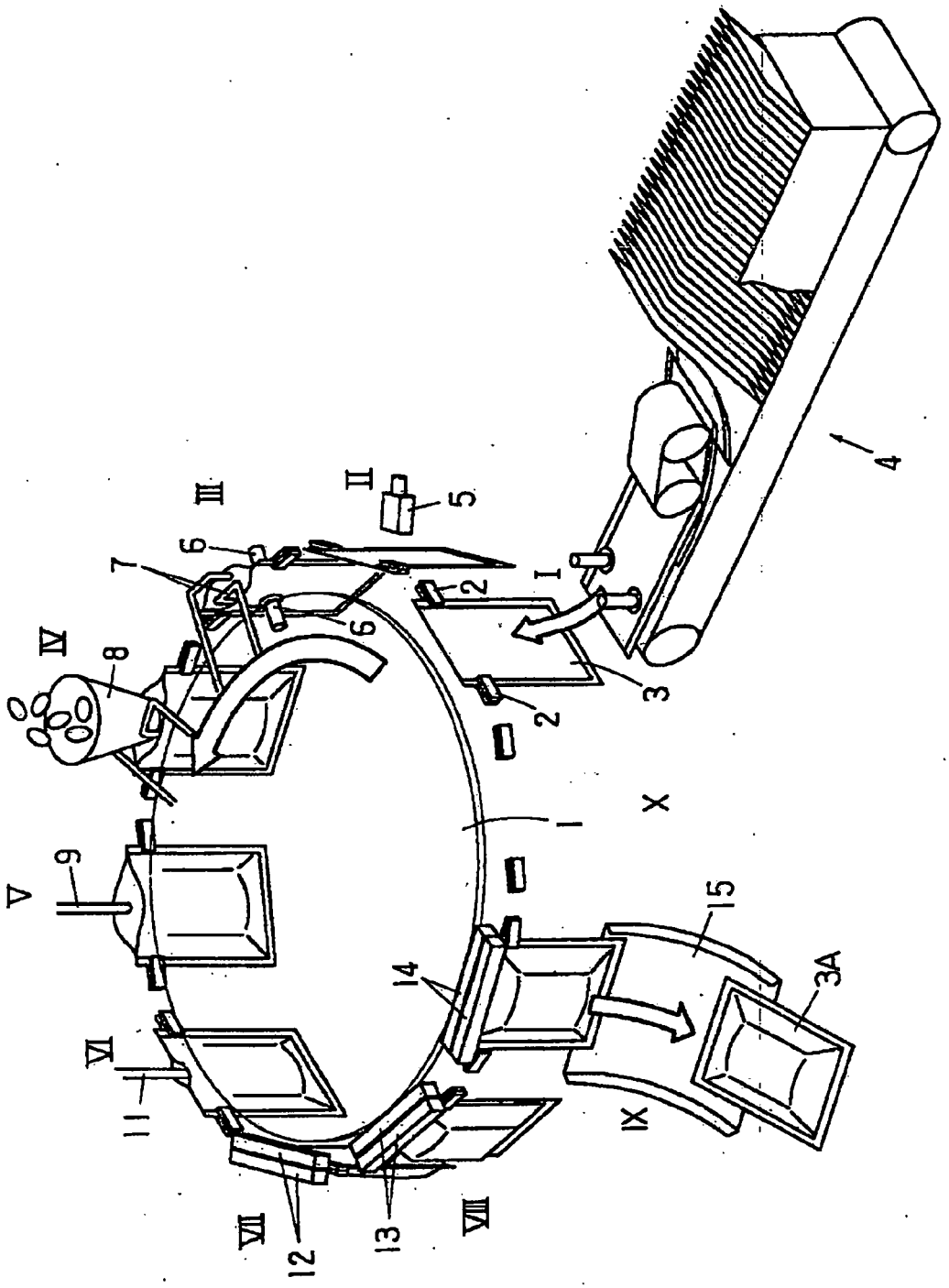


FIG. 13(a)
PRIOR ART

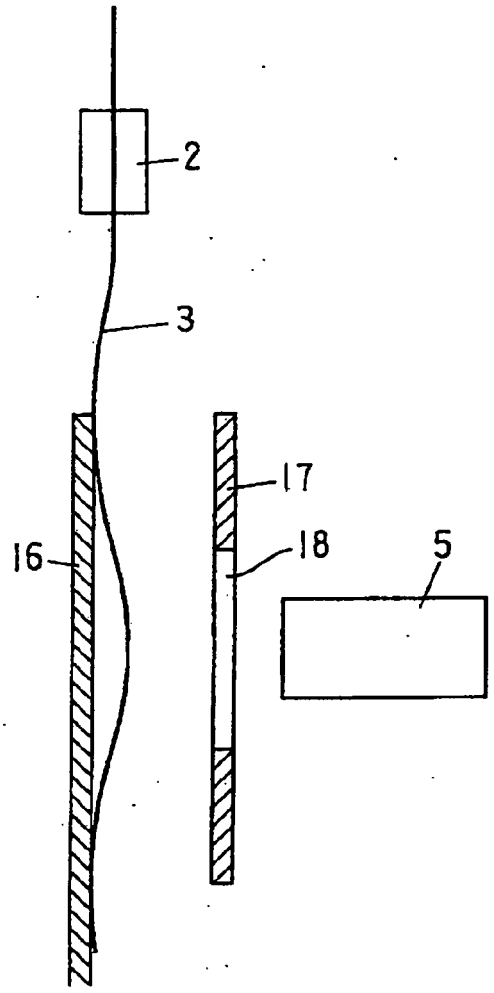
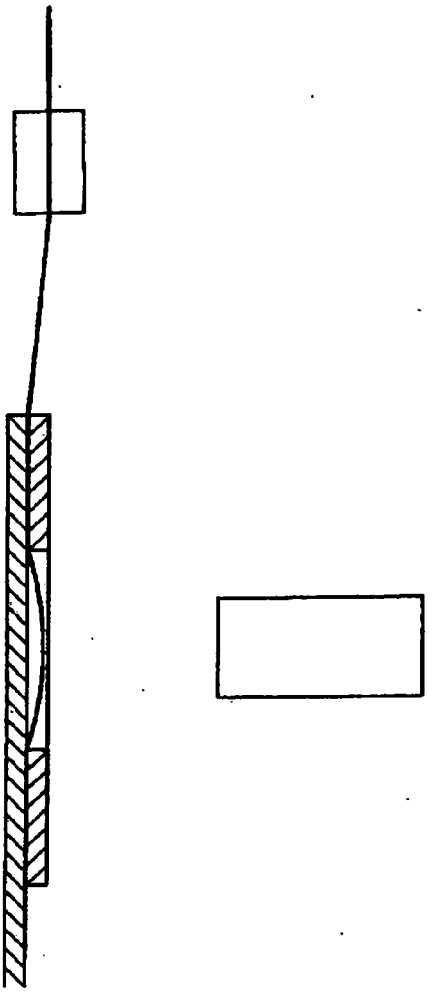


FIG. 13(b)
PRIOR ART



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- JP 3282803 B **[0010]**