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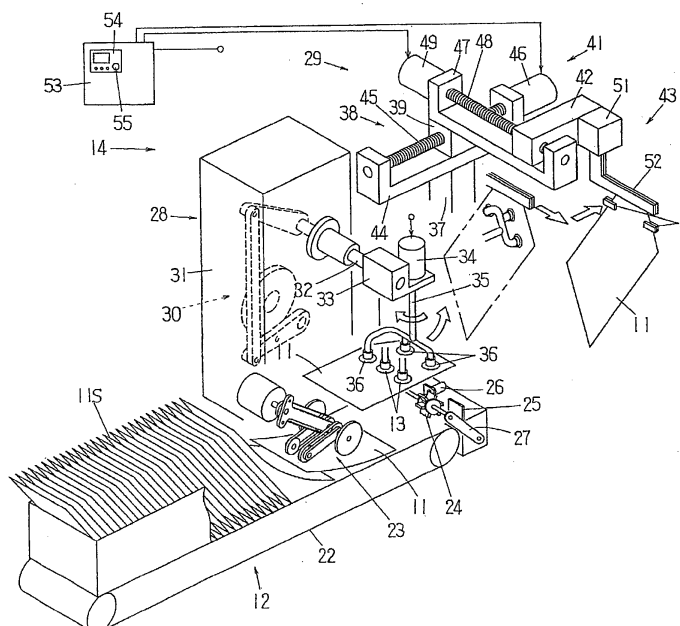
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(54) **Method and apparatus for manufacturing spout-equipped bags**

(57) Method and apparatus for manufacturing spout-equipped bags in which the lateral sides of a bag (11) are gripped by a pair of grippers (3, 3), the bag is conveyed along a conveying path, and a spout is attached to the bag mouth during the conveyance. Unloading suction members (13) adheres by suction to a bag in a horizontal orientation and takes out the bag (11); and then bag suction members (36) adheres to the bag (11) and changes the bag into a vertical orientation, the bag is

then rotated through a predetermined angle, making the bag mouth horizontal. A transfer chuck (52) grips the bag (11) and conveys it towards grippers (3, 3), and the bag is displaced a predetermined distance horizontally and supplied to the grippers. The horizontal displacement distance of the transfer chuck (52) is set in advance such that gripping margins on the bag (11) for the grippers (3, 3) are made substantially equal on the left and right of the bag (11).

FIG. 1



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a method and apparatus for manufacturing spout-equipped bags, in which two lateral edges of a bag are gripped by a pair of left and right grippers, the bag is conveyed along a pre-determined conveying path, and a spout is attached to the mouth of the bag during the conveyance process.

2. Description of related art

[0002] Japanese Patent No. 3261543 discloses a method for manufacturing spout-equipped bags (bags filled with contents). In this method, the orientation of a bag positioned in an empty bag storage device in a substantially horizontal orientation is changed to a substantially vertical orientation with the bag mouth directed upward, the bag is fed to grippers in a bag conveying device having a plurality of pairs of left and right grippers that are disposed at equal intervals along a circular travel path and intermittently travel along said travel path, and, as the bag is intermittently conveyed in concert with the travel of the grippers, a spout is attached to a slanted corner portion of the bag mouth, and then the bag is subsequently filled with a liquid substance by inserting a nozzle into the horizontal portion of the bag mouth. A spout attached to the slanted corner portion of the essentially quadrangular bag is referred to as a "corner spout", and a bag to which a corner spout is attached is referred to as a "bag for corner spout attachment".

[0003] Japanese Patent Application Laid-Open (Kokai) No. H07-187202 also discloses a method for manufacturing spout-equipped bags (bags filled with contents). In this method, a bag unloaded from an empty bag storage device is fed, in a substantially vertical orientation with the mouth of the bag directed upward, to grippers in a bag conveying device having a plurality of pairs of left and right grippers that are similarly disposed at equal intervals along a circular travel path and intermittently travel along the travel path, and, as the bag is intermittently conveyed in concert with the travel of the grippers, the bag is filled with a liquid substance by inserting a nozzle into the bag mouth, and a spout is subsequently attached to the central portion of the horizontal bag mouth. A spout attached to the central portion of the bag mouth, which is substantially parallel to the bag width direction of the substantially quadrangular bag, is referred to as a "center spout", and a bag to which a central spout is attached is referred to as a "bag for center spout attachment".

[0004] Japanese Patent No. 4566628 and Japanese Patent Application Laid-Open (Kokai) No. 2009-23280 disclose that when a spout (corner spout) is attached to a slanted bag mouth in a bag for corner spout attachment,

the bag is tilted to make it horizontal, with the bag mouth directed upward, and, in this state, the bag for corner spout attachment is fed to a spout mounting unit.

[0005] While the methods of manufacturing spout-equipped bags described in Japanese Patent No. 3261543 and Japanese Patent Application Laid-Open (Kokai) No. H07-187202 differ in terms of the sequence of the spout attachment and filling steps, the two methods are similar in that the two lateral edges of the bags are gripped by grippers, and, as the bags are intermittently conveyed while being held in a suspended state with the bag mouths directed upward, spouts are attached to pre-determined locations of the bag mouths during the conveyance process. Therefore, it can be readily appreciated that corner spout attachment (manufacture of spout-equipped bags having a corner spout attached thereto) and center spout attachment (manufacture of spout-equipped bags having a center spout attached thereto) can theoretically be carried out using an integrated apparatus for manufacturing spout-equipped bags. In addition, one can easily imagine that deactivating the parts associated with spout attachment in such an apparatus for manufacturing spout-equipped bags allows for filling and packaging regular flat-laying bags and self-supporting bags (without spout in both cases).

[0006] However, attempts to carry out corner spout attachment and center spout attachment using a single integrated attachment device (apparatus for manufacturing spout-equipped bags) bring about such practical problems as follows:

- (1) Attaching both corner spouts and center spouts using an integrated spout inserting/spout sealing device is impossible because corner spout attachment and center spout attachment differ in terms of bag mouth shape (bags for corner spout attachment have slanted bag mouths, and bags for center spout attachment have horizontal bag mouths) and spout feed direction relative to the bags (in the case of corner spouts, diagonally from above, and in the case of center spouts, directly from above in a vertical direction). While switching these devices between corner spout attachment and center spout attachment can be contemplated, a drop in productivity associated with such switching would be unavoidable.
- (2) During corner spout attachment as described in Japanese Patent No. 3261543, the two lateral edges of a bag are gripped by the grippers in a vertical orientation, in the same manner as during center spout attachment as described in Japanese Patent Application Laid-Open (Kokai) No. H07-187202; however, the position of the bag with respect to the grippers is higher than in the case of center spout attachment because a corner portion of the bags is cut off in an oblique manner. On the other hand, the upper surface of the liquid substance filled in the bag needs to be located below the lower edge of the grippers. The reason for this is that if the upper surface

of the liquid substance is located above the lower edge of the grippers, the liquid substance overflows through the mouth of the bag when the lateral spacing between the grippers is expanded and tension is applied to the mouth of the bag. Therefore, even though the corner spout is attached to a bag of the same size, the maximum amount of liquid substance that can be filled in the bag will be reduced in comparison with center spout attachment and the capacity of the bag will not be fully utilized. For this reason, in certain cases this necessitates the use of a bag that is one size larger.

[0007] On the other hand, in the case of corner spout attachment, if a bag for corner spout attachment is tilted such that the bag mouth, to which the spout is attached, becomes horizontal, and the bag is fed to the grippers in this state, as disclosed in Japanese Patent No. 3261543 and Japanese Patent Application Laid-Open (Kokai) No. H07-187202, then the direction of spout feed relative to the bag for corner spout attachment can be the same as the vertical direction in the case of center spout attachment, and, in addition, the elevation of the bag for corner spout attachment relative to the grippers can also be made substantially the same as the elevation of the bag for center spout attachment. Therefore, the above-described problems (1) and (2) are eliminated substantively.

(3) However, when a bag for corner spout attachment is tilted (rotated along the plane of the bag) such that the bag mouth, to which the spout is attached, becomes horizontal, and the bag is fed to a pair of left and right grippers in this state, problems arise again. In other words, inadequate gripping by the grippers occurs, including considerable differences in the gripping margins (margins) of the grippers on the left and on the right or one-sided gripping (a state wherein only one of the grippers makes gripping), and so on. These problems are particularly exacerbated when handling several types of bags for corner spout attachment in which different attachment angles are used for the corner spouts.

[0008] FIG. 7 shows changes in the left and right gripping margins on bags for grippers 3, 3 that occur when two types of bags for corner spout attachment 1, 2 that differ in terms of the angles of inclination of the bag mouths 1a and 2a, to which the corner spouts are to be attached, are rotated along the plane of the bags so as to make the bag mouths 1a, 2a horizontal and then fed to a pair of left and right grippers 3, 3. In FIG. 7 the reference numeral 4 designates a reference plane (perpendicular to the plane of the bag) containing the mid-width of the bags for corner spout attachment 1, 2 positioned in the bag storage device, not shown, and the center location of the left and right grippers 3, 3 stopped at the empty bag feeding position lies within this reference

plane 4. In the case of bags for center spout attachment, the mid-width of the bags does not deviate from this reference plane 4 while they are conveyed from the bag storage device to the grippers 3, 3.

[0009] If, immediately prior to being fed to the grippers 3, 3, the bags for corner spout attachment 1, 2 are rotated (the bags 1, 2 rotate along the plane of the bags) through a predetermined angle about a center of rotation 5 (an axis perpendicular to the plane of the bags) lying in the reference plane 4 so as to orient the bag mouths 1a, 2a horizontally, and are fed to the grippers 3, 3 in this state, then, as seen from the topmost illustration of FIG. 7, there is little difference between the left and right gripping margins for the grippers 3, 3 in the case of the bag for corner spout attachment 1, which is drawn by the 2-dot chain line, but there is considerable difference between the left and right gripping margins for the grippers 3, 3 in the case of the bag for corner spout attachment 2, which is drawn by the solid line.

SUMMARY OF THE INVENTION

[0010] Accordingly, it is an object of the present invention to prevent inadequate gripping by grippers by making left and right gripping margins on a bag for the grippers essentially equal even during corner spout attachment in a type of apparatus for manufacturing spout-equipped bags in which the opposite edges of a bag are gripped by a pair of left and right grippers, the bag is conveyed along a predetermined conveying path, and a spout is attached to the mouth of the bag in the conveyance process, and in which both corner spout attachment and center spout attachment are both performed.

[0011] The present invention provides an improved method for manufacturing spout-equipped bags, which comprises:

a bag unloading step for adhering by suction to an empty bag positioned in a substantially horizontal orientation in an empty bag storage device and upwardly unloading said bag;

a bag feeding step for changing the orientation of the upwardly unloaded bag to a substantially vertical orientation and feeding the bag to a pair of left and right grippers;

a bag conveying step for gripping predetermined locations on the opposite sides of the bag mouth using the pair of left and right grippers and conveying the bag along a predetermined conveying path;

a bag mouth opening step for opening the mouth of the bag; and

a spout attachment step for substantially vertically lowering a spout, inserting the spout into the opened bag mouth, and, subsequently, sealing the spout to the bag mouth, and

the bag mouth opening step and spout attachment step are performed on bags conveyed along the conveying path while the bag conveying step is being

performed, and

in the present invention, the bag is the one for corner spout attachment (with the mouth slanted in the bag width direction formed in a corner portion at the upper edge of the bag), and in the bag feeding step, the mouth of the bag is made substantially horizontal by rotating the bag through a predetermined angle along the plane of the bag and, at the same time, the gripping margins on the bag for the grippers are made substantially equal on the left side and on the right side of the bag by displacing the bag a predetermined distance horizontally along the plane of the bag.

[0012] In the above-described method for manufacturing spout-equipped bags, it is desirable to be able to switch between attaching spouts to bags for corner spout attachment and attaching spouts to bags for center spout attachment (that attaches spouts to bag mouths formed at the upper edge of the bags so as to be parallel to the bag width direction) by an operation of a switch. As described above, when a spout is attached to a bag for corner spout attachment, in the bag feeding step, the bag is rotated through a predetermined angle along the plane of the bag to make the bag mouth substantially horizontal and, at the same time, the bag is displaced a predetermined distance horizontally along the plane of the bag to make the gripping margins for the grippers substantially equal on the left and on the right. When a spout is attached to a bag for center spout attachment, the above-described rotation and displacement in the bag feeding step are not carried out because they are not necessary.

[0013] In the above-described method for manufacturing spout-equipped bags, a liquid filling step can be added between the bag mouth opening step and the spout attachment step. In this filling step, a nozzle is inserted into the open mouth of the bag conveyed along the conveying path, and the bag is filled with a liquid substance thereby.

[0014] Furthermore, in the above-described method for manufacturing spout-equipped bags, the bag feeding step is preferably comprised of a first feeding step and a second feeding step. In this case, in the first feeding step, the orientation of a bag upwardly unloaded from the empty bag storage device in the bag unloading step is changed to a substantially vertical orientation, and at the same time the bag is rotated through a predetermined angle along the plane of the bag to make the bag mouth substantially horizontal; and, in the second feeding step, the bag is conveyed toward the grippers while being displaced a predetermined distance horizontally along the plane of the bag. In the first feeding step the rotation of the bag can be performed at any point in time in the first feeding step, and in the second feeding step, the horizontal displacement of the bag can be performed at any point in time in the second feeding step.

[0015] Also, in the above-described method for manufacturing spout-equipped bags, the spout attachment

step preferably comprises a spout inserting/pre-sealing step and a permanent sealing step. In the spout inserting/pre-sealing step, the spout is inserted into the opened bag mouth and the spout is then pre-sealed to the bag mouth; and in the permanent sealing step, the pre-sealed spout is permanently sealed to the bag mouth (which also includes sealing the two surfaces of the bag mouth together). If necessary, the permanent sealing step can be repeated several times and/or a seal-cooling step can be added subsequent to the permanent sealing step.

[0016] In addition, the present invention provides an apparatus for manufacturing spout-equipped bags that comprises:

a bag conveying device having a plurality of pairs of right and left grippers that are disposed at equal intervals along a predetermined travel path, intermittently travel along said travel path, and expand or reduce the spacing therebetween along the travel path;

an empty bag storage device disposed in the vicinity of a bag feeding position, which is a stop position along the travel path, and has empty bags placed in a substantially horizontal orientation;

a bag unloading device having unloading suction members that adhere by suction to a bag placed in an empty bag storage device and upwardly unload the bag;

a bag feeding device that receives a bag from the unloading suction members, changes its orientation to a substantially vertical orientation, and feeds the bag to grippers stopped at the bag feeding position; a bag mouth opening device disposed in the vicinity of a bag mouth opening position, which is a stop position along the travel path, and has a pair of opening suction members positioned facing each other and capable of movement toward and away from each other, and opens a mouth of the bag by adhering by suction the opening suction members to both sides of the bag gripped by the grippers;

a spout inserting/pre-sealing device disposed in the vicinity of a spout inserting/pre-sealing position, which is a stop position along the travel path, and has a spout insertion member that moves substantially vertically up and down and holds a spout and a pair of pre-sealing members positioned facing each other and capable of movement toward and away from each other, and inserts a spout into an opened bag mouth using the spout insertion member and then pre-seals the spout in the mouth of the bag using the pre-sealing members; and

a permanent sealing device disposed at a permanent spout sealing position, which is a stop position along the travel path, and has a pair of permanent sealing members positioned facing each other and capable of movement toward and away from each other, and permanently seals the pre-sealed spout in the bag mouth using the permanent sealing members, and

in the present invention, which is an improvement of the above-described apparatus, the bag (having a slanted bag mouth formed in the bag width direction in a corner portion at the upper edge of the bag) is a bag for corner spout attachment, and the bag feeding device rotates the bag through a predetermined angle along the plane of the bag to make the bag mouth substantially horizontal, and displaces the bag a predetermined distance horizontally along the plane of the bag, so that the gripping margins on the bag for the pair of left and right grippers are substantially equal on the left and on the right of the bag.

[0017] In the above-described apparatus for manufacturing spout-equipped bags of the present invention, the bag feeding device comprises, for example:

(a) a bag holding member (bag suction member or a chuck, etc.), which holds a bag, a first drive source, which causes the bag holding member to swing in a vertical plane, a second drive source, which causes the bag holding member to pivot through a predetermined angle along the plane of the bag, a third drive source, which causes the bag holding member to move back and forth, and a fourth drive source, which causes the bag holding member to move in a side-to-side direction; or

(b) a first feeding device and a second feeding device, wherein

the first feeding device is provided with a bag suction member that adheres to a bag by suction, a first drive source, which causes the bag suction member to swing in a vertical plane between a position where the suction surface of the bag suction member is downwardly oriented and a position where the suction surfaces are forwardly oriented, and a second drive source, which causes the bag suction member to rotate in a clockwise and counterclockwise direction through a predetermined angle along the suction surface; and

the second feeding device is provided with a transfer chuck that grips the bag, a third drive source that causes the transfer chuck to move back and forth, and a fourth drive source that causes the transfer chuck to move in a side-to-side direction.

[0018] In the structures (a) and (b) described above, the operation of the first through fourth drive sources is controlled by a controller.

[0019] In the above-described apparatus for manufacturing spout-equipped bags of the present invention, it is desirable that switch between attaching spouts to bags for corner spout attachment and attaching spouts to bags for center spout attachment can be made by an operation of a switch.

[0020] When spouts are attached to bags for corner spout attachment, all of the first through fourth drive sources are in operation. As a result,

in the structure (a) above, the bag holding member swings to change the orientation of the bag to a substantially vertical orientation, and, by rotating, causes the bag to rotate through a predetermined angle along the plane of the bag, which makes the mouth of the bag substantially horizontal; and furthermore, while moving back and forth, it is displaced a predetermined distance horizontally along the plane of the bag, which makes the gripping margins for the pair of left and right grippers substantially equal on the left side and on the right, side, and in the structure (b) above, the bag suction member of the bag feeding device swings to change the orientation of the bag to a substantially vertical orientation, and, during rotation, causes the bag to rotate through a predetermined angle along the plane of the bag, thereby making the mouth of the bag substantially horizontal, and subsequently, the transfer chuck moves back and forth while the bag being displaced a predetermined distance horizontally along the plane of the bag, which makes the gripping margins for the pair of left and right grippers substantially equal on the left and on the right.

[0021] On the other hand, when spouts are attached to bags for center spout attachment, only the first and third drive sources are operated. Accordingly, in the structure (a) above, the bag suction member is not rotated or horizontally displaced; and in the structure (b) above, neither the bag suction member is rotated, nor the transfer chuck horizontally displaced.

[0022] In the above-described apparatus for manufacturing spout-equipped bags of the present invention, a liquid filling position can be provided as a stop position along the travel path between the bag mouth opening position and the spout inserting/pre-sealing position. A liquid filling device provided with an ascending/descending nozzle that can be raised and lowered is disposed in the vicinity of this liquid filling position. The nozzle is inserted into the mouth of a bag gripped by grippers stopped at the liquid filling position, and the bag is filled with a liquid substance thereby.

[0023] As seen from the above, according to the present invention, corner spout attachment is performed with an apparatus for manufacturing spout-equipped bags in which predetermined locations on the opposite sides of the mouth of a bag are gripped by a pair of left and right grippers, the bag is conveyed along a predetermined conveying path, and a spout is attached to the mouth of the bag during the conveyance process. In this corner spout attachment, a bag used for corner spout attachment is rotated through a predetermined angle along the plane of the bag and fed to the grippers with the bag mouth placed in a substantially horizontal orientation, as a result of which the direction of insertion of the spout can be oriented in the vertical direction, in the same manner as during center spout attachment, and the position of the bag with respect to the grippers can be set at substantially the same height as during center spout attachment. Additionally, the bag for corner spout attachment is displaced a predetermined distance horizontally

along the plane of the bag, and the gripping margins for the grippers are made substantially equal on the left side and on the right side of the bag, thereby making it possible to prevent defective gripping by the grippers. As a result, corner spout attachment and center spout attachment can be both carried out using the same apparatus for manufacturing spout-equipped bags.

[0024] When a bag for center spout attachment is fed to grippers, the bag is neither rotated nor horizontally displaced (both the angle of rotation and the distance of displacement are zero); and when a bag for corner spout attachment is fed to the grippers, the bag is rotated through a predetermined angle of rotation and displaced a certain distance horizontally depending on the geometry of the bag mouth. By way of inputting the angle of rotation and the distance of displacement into the controller that controls the feeding step in advance, it is sufficient to activate a switch in order to switch operations between rotating the bag through the angle of rotation and displacing it horizontally a certain distance and not rotating and not displacing it horizontally. If angles of rotation and travel distances determined by the respective bag mouth geometries are entered in advance for many types of bags for corner spout attachment, then it should be possible to rotate the bag through a certain angle of rotation and displace it a certain distance horizontally depending on the selected bag for corner spout attachment simply by operating a switch.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

[0025]

FIG. 1 is a perspective view of the principal part of an apparatus for manufacturing spout-equipped bags according to the present invention.

FIG. 2 is a flow diagram illustrating a method for manufacturing bags with center spouts using the apparatus for manufacturing spout-equipped bags shown in FIG. 1.

FIG. 3 is an explanatory diagram schematically illustrating a step in which a bag for center spout attachment is fed using the bag feeding device that is a part of the apparatus for manufacturing spout-equipped bags shown in FIG. 1.

FIG. 4 is a flow diagram illustrating a method for manufacturing bags with corner spouts using the apparatus for manufacturing spout-equipped bags shown in FIG. 1.

FIG. 5 is an explanatory diagram schematically illustrating a step in which a bag for corner spout attachment is fed using the bag feeding device that is a part of the apparatus for manufacturing spout-equipped bags shown in FIG. 1.

FIG. 6 is an explanatory diagram schematically illustrating a step in which another bag for corner spout attachment is fed using the bag feeding device that

is a part of the apparatus for manufacturing spout-equipped bags shown in FIG. 1.

FIG. 7 is an explanatory diagram illustrating problems arising when a bag for corner spout attachment is rotated along the plane of the bag and supplied to grippers.

DETAILED DESCRIPTION OF THE INVENTION

[0026] A method and apparatus for manufacturing spout-equipped bags according to the present invention will be described below in detail with reference to FIGS 1-6.

[0027] As shown in FIG. 1, the apparatus for manufacturing spout-equipped bags according to the present invention includes a bag conveying device (only its pair of left and right grippers 3, 3 stopped at the bag feeding position are shown in FIG. 1), an empty bag storage device 12, in which an empty bag (in this example, a bag for corner spout attachment) 11 is placed in a substantially horizontal orientation, a bag unloading device (only its pair of unloading suction members 13 are shown in FIG. 1), which adheres by suction to the bag 11 positioned in the empty bag storage device 12 and upwardly unloads the bag, and a bag feeding device 14, which receives the bag 11 upwardly unloaded by the bag unloading device, changes its orientation to a substantially vertical orientation, and feeds it to the grippers 3, 3.

[0028] Furthermore, this apparatus for manufacturing spout-equipped bags includes a bag mouth opening device (only its pair of opening suction members 15, 15 are shown in FIG. 2(e)) that opens the mouth of the bag 11 gripped by the grippers 3, 3, a filling device (only its nozzle 16 is shown in FIG. 2(f)) used to fill the bag 11 with a liquid substance, a spout inserting/pre-sealing device (only its pair of spout insertion members 18, 18 and its pair of pre-sealing members 19, 19 are shown in FIG. 2(g)) that inserts a spout 17 into the mouth of the bag 11 and then pre-seals (point-seals) the spout 17 to the mouth of the bag 11, and a permanent sealing device (only a pair of permanent sealing members 21, 21 are shown in FIG. 2(h)) that permanently seals the pre-sealed spout 17 to the mouth of the bag 11.

[0029] The bag conveying device has a plurality of pairs of left and right grippers 3, 3 disposed at equal intervals along a circular travel path in the same manner as described in, for example, Japanese Patent No. 3261543. The grippers 3, 3 intermittently travel along the travel path in the well-known manner, with the mutual spacing therebetween expanded or reduced, as well as opened and closed at known timing during their travel.

[0030] The empty bag storage device 12, the bag unloading device (unloading suction members 13), and the bag feeding device 14 are disposed in the vicinity of the bag feeding position, which is a stop position (a position where the grippers 3, 3 come to a stop) along the travel path.

[0031] The empty bag storage device 12 (see Japa-

nese Patent Application No. 2012-138361) is a so-called conveyor magazine-type empty bag feeding device, and it includes a belt conveyor 22 conveying a stack of bags 11S stacked with a shift in the fore-and-aft direction such that the bag mouths are forwardly oriented and the top bag faces forward; bag separating means 23, which is disposed above the belt conveyor 22 and separates the topmost bag from the bag stack 11S and sends it forward; a ratchet wheel 24, which is disposed at the front side of the bag separating means 23 and has a plurality of flexible radially extending pawl elements provided thereabout; a positioning stopper 25, which is disposed at the end of the belt conveyor 22 in abutment with the distal end of the bag 11 on the belt conveyor 22; and a sensor 26, which senses the abutment of the bag 11 against the stopper 25. The ratchet wheel 24 sends the bag 11 supplied by the bag separating means 23 further forward, causing it to abut the stopper 25. As soon as the sensor 26 senses the abutment of the bag 11 against the stopper 25, a lever 27 pivots forward, and the ratchet wheel 24 moves (retracts) in front of the stopper 25.

[0032] The transport direction of the conveyor belt 22 is oriented in a direction perpendicular to the travel path of the grippers 3, 3, and the mid-width of the bag 11 abutting the stopper 25 lies in the reference plane 4 (see FIG. 7). This reference plane passes through the center position between the left and right grippers 3, 3 stopped at the bag feeding position.

[0033] The bag unloading device has unloading suction members 13 that move up and down at the posterior side of the ratchet wheel 24. The unloading suction members 13 are lowered, adhered by suction to the surface of the bag 11 in abutment with the stopper 25, and raised, thereby upwardly unloading the adhered bag 11 from the conveyor belt 22. When the unloading suction members 13 are raised, the ratchet wheel 24 moves (retracts) in front of the stopper 25 and does not interfere with the upwardly unloaded bag 11.

[0034] The bag feeding device 14 is comprised of a first feeding device 28, which is disposed in the vicinity of the front end of the empty bag storage device 12 in the direction of transport, and a second feeding device 29, which is disposed in front of it.

[0035] The first feeding device 28 is comprised of a pivot shaft 32, which horizontally protrudes from inside the box 31 and is supported for free rotation; a first drive source 30, which is disposed inside the box 31 and causes the pivot shaft 32 to reciprocally pivot through a predetermined angular range; a mounting block 33 secured to the pivot shaft 32; a servo motor (second drive source) 34 disposed on the mounting block 33; a swing-shaft 35 serving as the output shaft of the servo motor 34; and a plurality of bag suction members 36 secured to the distal end of the swing-shaft 35. The suction surfaces of the bag suction members 36 are perpendicular to the longitudinal direction of the swing-shaft 35. The first drive source 30 is a mechanical cam operating in conjunction with the primary drive source of the bag conveying de-

vice.

[0036] Upon activation of the first drive source 30, the pivot shaft 32 pivots in a reciprocating manner and, along with this, through the medium of the mounting block 33, the swing-shaft 35 swings through an angular range of approximately 90° in a plane parallel to the reference plane 4 and, at the same time, the bag suction members 36 swing between a position in which the suction surfaces are downwardly oriented, and a position in which they are forwardly oriented. Upon activation of the servo motor 34 (only if the bag 11 has a corner spout), the swing-shaft 35 and bag suction members 36 rotate and counter-rotate through a predetermined angular range.

[0037] The second feeding device 29 comprises a stand 37, a first sliding mechanism 38 disposed on the stand 37, a second sliding mechanism 41 disposed on a sliding member 39 forming part of the first sliding mechanism 38, and a gripping/conveying mechanism 43 disposed on a sliding member 42 forming part of the second sliding mechanism 41.

[0038] The first sliding mechanism 38 comprises a support member 44 secured to the stand 37, the above-described sliding member 39, which is slidably supported on the support member 44, a screw shaft 45 threadably engaged with the sliding member 39 and having both ends thereof rotatably supported by the support member 44, and a servo motor (third driving source) 46, whose output shaft is coupled to one end of the screw shaft 45 and causes the screw shaft 45 to rotate clockwise and counterclockwise. Upon activation of the servo motor 46, the sliding member 39 slides horizontally (in the fore-and-aft direction) in a plane parallel to the reference plane 4.

[0039] The second sliding mechanism 41 comprises a support member 47 secured to the sliding member 39, the sliding member 42, which is slidably supported on the support member 47, a screw shaft 48 threadably engaged with the sliding member 42 and having both ends thereof rotatably supported by the support member 47, and a servo motor (fourth driving source) 49, whose output shaft is coupled to one end of the screw shaft 48 and causes the screw shaft 48 to rotate clockwise and counterclockwise. Upon activation of the servo motor 49 (only if the bag 11 has a corner spout), the sliding member 42 slides horizontally (left-to-right) in a plane perpendicular to the reference plane 4.

[0040] The gripping/conveying mechanism 43 comprises an air cylinder 51 secured to the sliding member 42, and a transfer chuck 52, which is opened and closed as the air cylinder 51 operates. When the transfer chuck 52 grips the bag 11, its gripping surfaces are perpendicular to the reference plane 4.

[0041] As shown in FIG. 2(e), the bag mouth opening device is provided with a pair of opening suction members 15, 15 disposed facing each other and capable of movement toward and away from each other. Located in the vicinity of the bag mouth opening position (the stop position where the bag mouth opening step is carried out), which is a stop position of the grippers 3, 3 along the

travel path, they open the mouth of the bag gripped by the grippers 3, 3 stopped at the bag mouth opening position.

[0042] As shown in FIG. 2(f), the filling device is provided with a nozzle 16 that moves vertically up and down. Located in the vicinity of the filling position (the stop position where the filling step is carried out), which is the stop position downstream of the bag mouth opening position, the nozzle 16 is inserted into the mouth of the bag 11 gripped by the grippers 3, 3 stopped at the filling position and fills the bag with a liquid substance.

[0043] As shown in FIG. 2(g), the spout inserting/pre-sealing device is provided with a pair of spout insertion members 18, 18, which move up and down holding a spout 17, and a pair of pre-sealing members (heating plates) 19, 19 disposed facing each other and capable of movement toward and away from each other. Located at the spout inserting/pre-sealing position (the stop position where the spout inserting/pre-sealing step is carried out), which is the stop position downstream of the filling position, the members insert the spout 17 into the mouth of the bag and then pre-seal the spout 17 in the mouth of the bag.

[0044] As shown in FIG. 2(h), the permanent sealing device is provided with a pair of permanent sealing members (heating plates) 21, 21 disposed facing each other and capable of movement toward and away from each other. Located at the permanent sealing position (the stop position where the permanent sealing step is carried out), which is the stop position downstream of the spout inserting/pre-sealing position, the members permanently seal the spout 17 in the mouth of the bag and simultaneously close the bag mouth by sealing the two surfaces of the bag together.

[0045] The bag mouth opening step, filling step, spout inserting/pre-sealing step, and permanent sealing step are performed on the bag 11 when it comes to a stop during movement along the conveying path while the step of conveying the bag 11 is being carried out in the bag conveying device, in other words, while the grippers 3, 3 are traveling in an intermittent manner along the travel path and intermittently conveying the gripped bag 11 along the predetermined conveying path. If necessary, the permanent sealing step can be carried out several times along the conveying path (e.g., by performing a primary heat-sealing step and a secondary heat-sealing step). Alternatively, a seal-cooling step (which involves cooling the heat-sealed location by holding it between cooling plates) can be carried out subsequent to the permanent sealing step.

[0046] The operation of the above-described devices is controlled in its entirety by a controller 53.

[0047] Next, referring to FIG. 2 to FIG. 6, a more specific description will now be made with reference to the bag unloading step performed by the bag unloading device (unloading suction members 13), the bag feeding step (first feeding step and second feeding step) performed by the bag feeding device 14, and further, the

bag mouth opening step, filling step, spout inserting/pre-sealing step, and permanent sealing step carried out by each device during the bag conveying step performed by the bag conveying device.

[0048] First of all, FIG. 2 describes the entire process of spout-equipped bag manufacture, in which a bag for center spout attachment (hereinafter referred to as "bag 11A") is substituted for the bag 11 illustrated in FIG. 1, and FIG. 3 primarily describes the bag unloading step and bag feeding step among the above-described manufacturing steps. The bag 11A is quadrangular in shape and has a bag mouth 11Aa formed parallel to the bag width direction, while the bottom portion and the two lateral sides thereof are sealed. In this case of bag for center spout attachment, the process of spout-equipped bag manufacture is executed as follows:

(1) Positioning in empty bag storage device (FIG. 2(a), FIG. 3(a))

[0049] The bag 11A conveyed through the empty bag storage device 12 abuts the stopper 25 and is positioned in a substantially horizontal orientation.

(2) Bag unloading step (FIG. 2(b), FIG. 3(a))

[0050] After lowering the unloading suction members 13 and adhering them by suction to the positioned bag 11A, the members are raised, thereby upwardly unloading the bag 11A.

(3) First feeding step (FIG. 2(c), FIG. 3(b))

[0051] The bag suction members 36 adhere to the upwardly unloaded bag 11A by suction, after which the application of suction by the unloading suction members 13 is stopped. Subsequently, the first drive source 30 is actuated and the swing-shaft 35 and bag suction members 36 swing forward. As a result, the bag 11A adhered to the bag suction members 36 is conveyed forwardly and upwardly while simultaneously having its orientation changed to a vertical orientation.

(4) Second feeding step (FIG. 2(d), FIG. 3(c))

[0052] The air cylinder 51 is actuated, the transfer chuck 52 grips the mouth 11Aa of the bag 11A, whose orientation has been changed to a substantially vertical orientation, after which the application of suction by the bag suction members 36 is stopped. Subsequently, the servo motor 46 is actuated, and the sliding member 39 moves forward. As a result, the transfer chuck 52 and the bag 11A gripped by the transfer chuck 52 are conveyed forwardly to a predetermined position. On the other hand, when the bag suction members 36 stop applying suction, the swing-shaft 35 and bag suction members 36 swing backward under the action of the first drive source 30, thereby returning to the initial position where they

remain in standby mode until the next suction operation.

(5) Gripping with grippers (FIG. 2(d), FIG. 3(c))

[0053] The grippers 3, 3 grip predetermined locations (lateral sides) on two opposite sides of the mouth 11Aa of the bag 11A conveyed to the predetermined position by the transfer chuck 52. The left and right gripping margins on the bag for the grippers 3, 3 that grip the bag 11A are of course set to be essentially equal. Subsequently, the air cylinder 51 operates in reverse and the transfer chuck 52 opens, releasing the bag 11A. When the transfer chuck 52 opens, the servo motor 46 operates in reverse, the sliding member 39 moves rearward, and the transfer chuck 52 returns to the original position where it remains in standby mode until the next gripping operation.

(6) Bag mouth opening step (FIG. 2(e))

[0054] After the transfer chuck 52 is opened and the bag 11A is released, the step of conveying the bag 11A gripped by the grippers 3, 3 is initiated. When the grippers 3, 3 stop at the bag mouth opening position in this conveying step, a pair of opening suction members 15, 15 approach the bag 11A from both sides, adhere to the surface of the bag by suction, and then move away from each other. At the same time, the grippers 3, 3 reduce the lateral spacing to thereby open the bag mouth 11Aa.

(7) Filling step (FIG. 2(f))

[0055] When the grippers 3, 3 stop at the liquid filling position, the nozzle 16 is lowered, its distal end is inserted into the bag through the opened bag mouth 11Aa of the bag 11A, and the bag is filled with a liquid substance through the nozzle.

(8) Spout inserting/pre-sealing step (FIG. 2(g))

[0056] When the grippers 3, 3 stop at the spout inserting/pre-sealing position, the spout insertion members 18, 18 gripping the spout 17 are lowered and the spout 17 is inserted into the mid-width portion of the opened bag mouth 11Aa of the bag 11A. Subsequently, the lateral spacing of the grippers 3, 3 is increased and tension is applied to the bag mouth 11Aa, and then a pair of pre-sealing members 19, 19 approach both sides of the bag 11A and pre-seal (form an insertion point seal around) the spout 17 in the bag mouth 11Aa.

(9) Permanent sealing step (FIG. 2(h))

[0057] When the grippers stop at the permanent sealing position, a pair of permanent sealing members 21, 21 approach both sides of the bag 11A and permanently seal the spout 17 in the bag mouth 11Aa while simultaneously sealing the two surfaces of the bag, thereby clos-

ing the bag mouth 11Aa. In addition, the same permanent sealing step is carried out again at the next stop position and, furthermore, a seal-cooling step is carried at the next stop position.

(10) Discharge of spout-equipped bag product (FIG. 2(i))

[0058] At the stop position subsequent to the termination of the above-described steps, the bag 11A is released by opening the grippers 3, 3, and the product, i.e. the spout-equipped bag (filled with a liquid substance), is discharged from the conveying device.

[0059] If a bag for center spout attachment 11A is fed to the grippers 3, 3 as in this example, the servo motor 34 (the second drive source) and the servo motor 49 (the fourth drive source) are not operated in the above-described first feeding step and second feeding step. For this reason, as shown in FIG. 3, after being positioned in the empty bag storage device 12, the bag for center spout attachment 11A is fed to the grippers 3, 3 through the medium of the bag unloading step and bag feeding step, and at no time does the mid-width of the bag for center spout attachment 11A deviate from the reference plane 4 until it is gripped by the grippers 3, 3.

[0060] The above-described apparatus for manufacturing spout-equipped bags can be for the operation of filling regular spoutless flat-laying bags and self-supporting bags. In such a case, the empty bag storage device 12, bag unloading device (unloading suction members 13), bag feeding device 14, and bag conveying device (grippers 3, 3), as well as the bag mouth opening device (opening suction members 15, 15) and filling device (nozzle 16) remain in the same state, while the spout inserting/pre-sealing device is deactivated and the permanent sealing members 21, 21 of the permanent sealing device are replaced with regular heating plates used for bag mouth sealing.

[0061] In addition, this apparatus for manufacturing spout-equipped bags can be used as an apparatus for spout attachment only, without operating the filling device (nozzle 16).

[0062] FIG. 4 describes the entire process of spout-equipped bag manufacture, in which the bag 11 illustrated in FIG. 1 is a bag for corner spout attachment (hereinafter referred to as "bag 11B"), and FIG. 5 primarily describes the bag unloading step and bag feeding step among the above-described manufacturing steps. The bag 11B is essentially quadrangular in shape and has a bag mouth 11Ba formed inclined (at an angle of inclination θ_B relative to the bag width direction) in one corner portion at the top of the bag. The bottom and two lateral sides, as well as locations other than the bag mouth 11Ba at the top, are sealed. In this case of bag for corner spout attachment, the process of spout-equipped bag manufacture is executed as follows:

(1) Positioning in empty bag storage device (FIG. 4(a), FIG. 5(a))

[0063] The bag 11B conveyed through the empty bag storage device 12 abuts the stopper 25 and is positioned in a substantially horizontal orientation.

(2) Bag unloading step (FIG. 4(b), FIG. 5(a))

[0064] After lowering the unloading suction members 13 and adhering them by suction to the positioned bag 11B, the members are raised, thereby upwardly unloading the bag 11B.

(3) First feeding step (FIG. 4(c), FIG. 5(b))

[0065] The bag suction members 36 adhere to the upwardly unloaded bag 11B by suction, after which the application of suction by the unloading suction members 13 is stopped. Subsequently, the first drive source 30 is actuated and the swing-shaft 35 and bag suction members 36 swing forward. As a result, the bag 11B adhered to the bag suction members 36 is conveyed forwardly and upwardly while simultaneously having its orientation changed to a vertical orientation. In addition, while the bag is conveyed, the servo motor 34 operates and rotates the swing-shaft 35 and bag suction members 36 through a predetermined angle (θ_B). As the swing-shaft 35 and bag suction members 36 rotate, the bag 11B rotates along the plane of the bag through the same angle as the swing-shaft 35 (θ_B) about an axis of rotation O, which lies in the reference plane 4 (see hollow arrows in FIG. 5(b)), thereby making the bag mouth 11Ba of the bag 11B substantially horizontal. The center of rotation of the swing-shaft 35 is the axis of rotation O.

(4) Second feeding step (FIG. 2(d), FIG. 5(c))

[0066] The air cylinder 51 is actuated, the transfer chuck 52 grips the mouth 11Ba of the bag 11B, whose orientation has been changed to a substantially vertical orientation, after which the application of suction by the bag suction members 36 is stopped. Subsequently, the servo motor 49 operates, the sliding member 42 horizontally travels a predetermined distance (D_B), and, as a result, the transfer chuck 52 and bag 11B horizontally travel the same distance (D_B) as the sliding member 42 along the plane of the bag in direction of the hollow arrow of FIG. 5(c). Next, the servo motor 46 operates, the sliding member 39 moves forward, and the bag 11B is conveyed to a predetermined forward position. On the other hand, when the bag suction members 36 stop applying suction, the swing-shaft 35 and bag suction members 36 swing through the predetermined angle (θ_B) backward under the action of the first drive source 30 and the servo motor 34, thereby returning to the initial position where they remain in standby mode until the next suction operation.

(5) Gripping with grippers (FIG. 4(d), FIG. 5(c))

[0067] The grippers 3, 3 grip predetermined locations (top and lateral portion on one side) on two opposite sides of the mouth 11Ba of the bag 11B conveyed to the predetermined position by the transfer chuck 52. In the bag feeding step, the bag 11B was horizontally displaced a distance D_B ; as a result, the left and right gripping margins for the grippers 3, 3 used to grip the bag 11B have become substantially equal. Subsequently, the air cylinder operates in reverse and the transfer chuck 52 opens, releasing the bag 11B. When the transfer chuck 52 opens, the servo motor 46 operates in reverse, and the sliding member 39 moves rearward, and then the servo motor 49 operates in reverse, the sliding member 42 moves horizontally in a reverse direction, and the transfer chuck 52 returns to the original position where it remains in standby mode until the next gripping operation.

(6) Bag mouth opening step (FIG. 4(e))

[0068] After the transfer chuck 52 is opened and the bag 11B is released, the step of conveying the bag 11B gripped by the grippers 3, 3 is initiated. When the grippers 3, 3 stop at the bag mouth opening position in the conveying step, a pair of opening suction members 15, 15 approach the bag 11B from both sides, adhere to the surface of the bag by suction, and then move away from each other. At the same time, the grippers 3, 3 reduce the lateral spacing to thereby open the bag mouth 11Ba.

(7) Filling step (FIG. 4(f))

[0069] When the grippers 3, 3 stop at the liquid filling position, the nozzle 16 is lowered and inserted into the bag through the opened bag mouth 11Ba of the bag 11B, and the bag is filled with a liquid substance through the nozzle.

(8) Spout inserting/pre-sealing step (FIG. 4(g))

[0070] When the grippers 3, 3 stop at the spout inserting/pre-sealing position, the spout insertion members 18, 18 gripping the spout 17 are lowered, and the spout 17 is inserted into the mid-width portion of the opened bag mouth 11Ba of the bag 11B. Subsequently, the lateral spacing of the grippers 3, 3 is increased and tension is applied to the bag mouth 11Ba, and then a pair of pre-sealing members 19, 19 approach both sides of the bag 11B and pre-seal (form an insertion point seal around) the spout 17 in the bag mouth 11Ba.

(9) Permanent sealing step (FIG. 4(h))

[0071] When the grippers stop at the permanent sealing position, a pair of permanent sealing members 21, 21 approach both sides of the bag 11B and permanently seal the spout 17 in the bag mouth 11Ba while simulta-

neously sealing the two surfaces of the bag, thereby closing the bag mouth 11Ba. In addition, the same permanent sealing step is carried out again at the next stop position and, furthermore, a seal-cooling step is carried at the next stop position. In this example, the permanent sealing members 21, 21 are replaced with members used for the bag 11B.

(10) Discharge of spout-equipped bag product (FIG. 4(i))

[0072] At the stop position subsequent to the termination of the above-described steps, the bag 11B is released by opening the grippers 3, 3, and the product, i.e. the spout-equipped bag, is discharged from the conveying device.

[0073] As described above, in the method for manufacturing spout-equipped bags using bags for corner spout attachment (bag 11B), in the first feeding step, the servo motor (second drive source) 34 is operated to rotate the bag 11B through a predetermined angle (θ_B) and, in the second feeding step, the servo motor (fourth drive sources) 49 is operated to displace the bag 11B a predetermined distance horizontally (D_B). In addition, all the steps other than the bag feeding step (first feeding step and second feeding step) can be carried out in substantially the same manner as in the manufacture of spout-equipped bags using bags for center spout attachment (bag 11A).

[0074] FIG. 6 describes a bag unloading step and a bag feeding step used when the bag 11 shown in FIG. 1 is a different corner spout attachment (hereinafter referred to as "bag 11C"). In the same manner as the bag 11B, the bag 11C is essentially quadrangular in shape, and it has a bag mouth 11Ca formed inclined (at an angle of inclination θ_C relative to the bag width direction) in one corner portion at the top of the bag. Its bottom and two lateral sides, as well as locations other than the bag mouth 11Ca at the top, are sealed.

[0075] The angle of inclination (θ_C) of the bag mouth 11Ca is smaller than the angle of inclination (θ_B) of the bag mouth 11Ba of the bag 11B. As a result, the angle of rotation of the swing-shaft 35 in the first feeding step, in other words, the angle of rotation of the bag 11C (θ_C) is smaller than the angle of rotation (θ_B) of the bag 11B. In addition, the displacement distance of the sliding member 42 in the second feeding step, i.e. the displacement distance of the bag 11C ($-D_C$), differs from the displacement distance (D_B) of the bag 11B. The reason for using a minus sign for the displacement distance ($-D_C$) is due to the fact that the direction of displacement is opposite to that of the bag 11B. Furthermore, the locations gripped by the grippers 3, 3 are a lateral portion on one side of the bag 11C and the vicinity of the corner portion on the other side.

[0076] When spout-equipped bags are manufactured using the bag 11C, all the steps other than the bag feeding step (first feeding step and second feeding step) can be carried out in the same manner as in the manufacture of

spout-equipped bags using the bag 11B. In addition, in the bag feeding step, only the angle of rotation (θ) and the distance of horizontal displacement (D) are different.

[0077] Values such as the distance of horizontal displacement (D) and the angle of rotation (θ) of the bag for corner spout attachment in the bag feeding step, in other words, the distance (D) of displacement of the sliding member 42 and the angle of rotation (θ) of the swing-shaft 35 in the bag feeding device 14, are determined by the geometry of the bag mouth of the bag for corner spout attachment. In cases of bags for center spout attachment and common flat-laying bags and self-supporting bags without spouts, θ (angle of rotation) = 0, and D (displacement distance) = 0.

[0078] When data on the angles of rotation (θ) and displacement distances (D) are pre-stored in the controller 53 as controlled parameters for more than one type of bag to be used in the above-described apparatus for manufacturing spout-equipped bags and switching between different bag types is carried out by an operation of a switch 55 on the control panel 54 of the controller 53, the corresponding angles of rotation (θ) and displacement distances (D) are selected accordingly. Then, when the operation of the above-described apparatus for manufacturing spout-equipped bags is initiated, the controller 53 controls the operation of the servo motor 34 of the feeding device 14 (second drive source) and the servo motor 49 (fourth drive source) such that the corresponding angle of rotation (θ) and displacement distance (D) are obtained.

[0079] For example, when switching to bag 11A from another bag by an operation of the switch 55, both the angle of rotation (θ) and the displacement distance (D) after the switch are zero, and the controller 53 does not operate the servo motor 34 and servo motor 49 of the feeding device 14. Next, when switching from bag 11A to bag 11B by an operation of the switch 55, the angle of rotation (θ) and displacement distance (D) after the switch are $\theta = \theta_B$ and $D = D_B$, and the controller 53 operates the servo motor 34 and servo motor 49 and controls them so as to obtain the angle of rotation (θ_B) and displacement distance (D_B). Further, when switching from bag 11B to bag 11C by an operation of the switch 55, the selected angle of rotation (θ) and displacement distance (D) are $\theta = \theta_C$ and $D = -D_C$, and the controller 53 operates the servo motor 34 and servo motor 49 of the feeding device 14 and controls them so as to obtain the angle of rotation (θ_C) and displacement distance ($-D_C$).

[0080] In addition, as shown in FIGs. 3(c), 5(c), and 6(c), the distances H (H_A , H_B , H_C) from the grippers 3, 3 to the edges of the bag mouth openings of the bags 11A, 11B, and 11C gripped by the transfer chuck 52 remain unchanged regardless of bag type differences (different angles of inclination of the bag mouths 11Aa, 11Ba, and 11Ca). For this reason, the vertical seal width of the bag mouths of the bags 11A, 11B, and 11C remains unchanged.

[0081] As shown in FIGs. 3(a), 5(a), and 6(a), in order to keep the distances H (H_A , H_B , H_C) constant, the distances T (T_A , T_B , T_C) from the upper edges of the bags 11A, 11B, and 11C to the axis of rotation O (the center of rotation of the swing-shaft 35) are modified depending on the type of bag. To change the distances T (T_A , T_B , T_C), it is sufficient to change the location of the stopper 25 of the empty bag storage device 12 in the fore-and-aft direction.

[0082] Instead of changing the position of the stopper 25, it is possible to make the distances H (H_A , H_B , and H_C) constant using, for example, the means as follows:

(a) The angle of reciprocal pivoting of the pivot shaft 32 (the reciprocal swing angle of the swing-shaft 35) is adjusted depending on the type of bag. In this case, the position of the axis of rotation O (the center of rotation of the swing-shaft 35) obtained when the swing-shaft 35 arrives at the downward swing end position, in other words, the distances T (T_A , T_B , T_C) from the upper edges of the bags 11A, 11B, and 11C to the axis of rotation O (the center of rotation of the swing-shaft 35) remain unchanged, and the swing angle of the swing-shaft 35 between the above-described position and an upward swing end position is varied in accordance with the type of bag. As a result, the distance H (H_A , H_B , H_C) can be kept constant regardless of the differences in the type of bag (differences in the angle of inclination of the bag mouths 11Aa, 11Ba, and 11Ca).

In order to be able to vary the reciprocal pivoting angle of the pivot shaft 32 (the reciprocal swing angle of the swing-shaft 35), the first drive source 30 that reciprocatingly pivots the pivot shaft 32 needs to be replaced with a servo motor and the like, and not a mechanical cam that operates in conjunction with the main drive source of the bag conveying device. (b) The stand 37 is enabled for being raised and lowered by linking it to a servo motor or another drive source, and, once the transfer chuck 52 grips the upper edge of the bag, the stand 37 is moved up and down in accordance with the type of bag, and the height of the transfer chuck 52 is adjusted so that the distances H (H_A , H_B , H_C) remain unchanged. In this case, the reciprocal pivoting angle of the pivot shaft 32 (the reciprocal swing angle of the swing-shaft 35) may remain unchanged.

[0083] On the other hand, the vertical seal width of the bag mouths 11Aa, 11Ba, and 11Ca can be intentionally changed either by changing the position of the stopper 25, by changing the reciprocal pivoting angle (the reciprocal swing angle of the swing-shaft 35) of the pivot shaft 32 as described in (a) above, or by adjusting the height of the transfer chuck 52 by moving the stand 37 up and down as described in (b) above.

[0084] In the above-described apparatus for manufacturing spout-equipped bags, the bag feeding device 14

is comprised of the first feeding device 28, which carries out the first feeding step, and the second feeding device 29, which carries out the second feeding step. Such separation of the feeding step into two steps makes it possible to enhance processing power by carrying out each step in a separate device. However, it is also possible to perform the first feeding step and the second feeding step in a single bag feeding device. A specific embodiment thereof can be outlined as follows with reference to FIG. 1, and it is a construction in which the first sliding mechanism 38 is secured to the pivot shaft 32 (in the same manner as in the second feeding device 29 of FIG. 1, the second sliding mechanism 41 is installed in the sliding member 39 of the first sliding mechanism 38), and a mounting block 33 (in the same manner as in the first feeding device 28 of FIG. 1, a servo motor 34 is secured to the mounting block 33 and a plurality of bag suction members 36 are secured to its output shaft (swing-shaft 35)) is secured to the sliding member 42 of the second sliding mechanism 41. Instead of securing the bag suction members 36 to the output shaft (swing-shaft 35) of the servo motor 34, such a construction can be employed that an air cylinder 51 (including the transfer chuck 52) is secured thereto.

Claims

1. A method for manufacturing spout-equipped bags, comprising:

a bag unloading step for adhering by suction to an empty bag positioned in a substantially horizontal orientation in an empty bag storage device and upwardly unloading the bag;
a bag feeding step for changing an orientation of the upwardly unloaded bag to a substantially vertical orientation and feeding the bag to a pair of left and right grippers;
a bag conveying step for gripping predetermined locations on opposite sides of a mouth of the bag using the pair of left and right grippers and conveying the bag along a predetermined conveying path;
a bag mouth opening step for opening the mouth of the bag; and
a spout attachment step for substantially vertically lowering a spout, inserting the spout into the opened bag mouth, and, subsequently, sealing the spout to the bag mouth, and
the bag mouth opening step and the spout attachment step are performed on bags conveyed along a conveying path while the bag conveying step is being performed,
wherein:

the bag has a bag mouth formed slanted in a bag width direction in a corner portion at

- a spout inserting/pre-sealing step, in which the spout is inserted into the opened bag mouth, and the spout is then pre-sealed in the bag mouth, and
- a permanent sealing step, in which the pre-sealed spout is permanently sealed in the bag mouth. 5
8. The method for manufacturing spout-equipped bags according to Claim 2, wherein the spout attachment step is comprised of: 10
- a spout inserting/pre-sealing step, in which the spout is inserted into the opened bag mouth, and the spout is then pre-sealed in the bag mouth, and 15
- a permanent sealing step, in which the pre-sealed spout is permanently sealed in the bag mouth. 20
9. An apparatus for manufacturing spout-equipped bags comprising:
- a bag conveying device having a plurality of pairs of right and left grippers that are disposed at equal intervals along a predetermined travel path, intermittently travel along said travel path, and expand or reduce a spacing therebetween along the travel path; 25
- an empty bag storage device disposed in the vicinity of a bag feeding position, which is a stop position along the travel path, and has empty bags placed in a substantially horizontal orientation; 30
- a bag unloading device having unloading suction members that adhere by suction to a bag placed in an empty bag storage device and upwardly unload the bag; 35
- a bag feeding device that receives the bag from the unloading suction members, changes an orientation thereof to a substantially vertical orientation, and feeds the bag to grippers stopped at the bag feeding position; 40
- a bag mouth opening device disposed in the vicinity of a bag mouth opening position, which is a stop position along the travel path, and has a pair of opening suction members positioned facing each other and capable of movement toward and away from each other, and opens a mouth of the bag by adhering by suction the opening suction members to both sides of the bag gripped by the grippers; 45
- a spout inserting/pre-sealing device disposed in the vicinity of a spout inserting/pre-sealing position, which is a stop position along the travel path, and has 50
- a spout insertion member that moves substantially vertically up and down and holds a spout, 55

and

a pair of pre-sealing members positioned facing each other and capable of movement toward and away from each other, and

inserts a spout into the opened bag mouth using the spout insertion member and then pre-seals the spout in the mouth of the bag using the pre-sealing members; and

a permanent sealing device disposed at a permanent spout sealing position, which is a stop position along the travel path, and has a pair of permanent sealing members positioned facing each other and capable movement toward and away from each other, and permanently seals the pre-sealed spout in the bag mouth using the permanent sealing members,

wherein:

the bag is formed with a slanted bag mouth in a bag width direction in a corner portion at an upper edge thereof, and

the bag feeding device rotates the bag through a predetermined angle along the plane of the bag to make the bag mouth substantially horizontal, and also displaces the bag a predetermined distance horizontally along the plane of the bag, so that gripping margins on the bag for pair of left and right grippers are made substantially equal on left and right sides of the bag.

10. An apparatus for manufacturing spout-equipped bags comprising:

a bag conveying device having a plurality of pairs of right and left grippers that are disposed at equal intervals along a predetermined travel path, intermittently travel along said travel path, and expand or reduce a spacing therebetween along the travel path;

an empty bag storage device disposed in the vicinity of a bag feeding position, which is a stop position along the travel path, and has empty bags placed in a substantially horizontal orientation;

a bag unloading device having unloading suction members that adhere by suction to a bag placed in an empty bag storage device and upwardly unload the bag;

a bag feeding device that receives the bag from the unloading suction members, changes an orientation thereof to a substantially vertical orientation, and feeds the bag to grippers stopped at the bag feeding position;

a bag mouth opening device disposed in the vicinity of a bag mouth opening position, which is a stop position along the travel path, and has a pair of opening suction members positioned fac-

ing each other and capable of movement toward and away from each other, and opens a mouth of the bag by adhering by suction the opening suction members to both sides of the bag gripped by the grippers;

a spout inserting/pre-sealing device disposed in the vicinity of a spout inserting/pre-sealing position, which is a stop position along the travel path, and has

a spout insertion member that moves substantially vertically up and down and holds a spout, and

a pair of pre-sealing members positioned facing each other and capable of movement toward and away from each other, and

inserts a spout into the opened bag mouth using the spout insertion member and then pre-seals the spout in the mouth of the bag using the pre-sealing members; and

a permanent sealing device disposed at a permanent spout sealing position, which is a stop position along the travel path, and has a pair of permanent sealing members positioned facing each other and capable movement toward and away from each other, and permanently seals the pre-sealed spout in the bag mouth using the permanent sealing members,

wherein:

the bag feeding device comprises:

a bag holding member, which holds a bag;

a first drive source, which causes the bag holding member to swing in a vertical plane;

a second drive source, which causes the bag holding member to pivot through a predetermined angle in the clockwise and counterclockwise direction along the plane of the bag;

a third drive source, which causes the bag holding member to move back and forth; and

a fourth drive source, which causes the bag holding member to move in a side-to-side direction, and

a controller controlling the operation of the first through fourth drive sources;

the bag is formed with a slanted bag mouth in a bag width direction in a corner portion at an upper edge thereof; and

as the first through fourth drive sources operate,

the bag holding member of the bag feeding device

swings to change the orientation of the bag

to a substantially vertical orientation;

rotates so as to cause the bag to rotate through a predetermined angle in the plane of the bag, thereby making the bag mouth substantially horizontal, and

makes back-and-forth movement, and moves horizontally along the plane of the bag,

thereby making gripping margins on the bag for the pair of left and right grippers substantially equal on left and right sides of the bag.

11. An apparatus for manufacturing spout-equipped bags comprising:

a bag conveying device having a plurality of pairs of right and left grippers that are disposed at equal intervals along a predetermined travel path, intermittently travel along said travel path, and expand or reduce a spacing therebetween along the travel path;

an empty bag storage device disposed in the vicinity of a bag feeding position, which is a stop position along the travel path, and has empty bags placed in a substantially horizontal orientation;

a bag unloading device having unloading suction members that adhere by suction to a bag placed in an empty bag storage device and upwardly unload the bag;

a bag feeding device that receives the bag from the unloading suction members, changes an orientation thereof to a substantially vertical orientation, and feeds the bag to grippers stopped at the bag feeding position;

a bag mouth opening device disposed in the vicinity of a bag mouth opening position, which is a stop position along the travel path, and has a pair of opening suction members positioned facing each other and capable of movement toward and away from each other, and opens a mouth of the bag by adhering by suction the opening suction members to both sides of the bag gripped by the grippers;

a spout inserting/pre-sealing device disposed in the vicinity of a spout inserting/pre-sealing position, which is a stop position along the travel path, and has

a spout insertion member that moves substantially vertically up and down and holds a spout, and

a pair of pre-sealing members positioned facing each other and capable of movement toward and away from each other, and

inserts a spout into the opened bag mouth using the spout insertion member and then pre-seals the spout in the mouth of the bag using the pre-sealing members; and

a permanent sealing device disposed at a permanent spout sealing position, which is a stop position along the travel path, and has a pair of permanent sealing members positioned facing each other and capable movement toward and away from each other, and permanently seals the pre-sealed spout in the bag mouth using the permanent sealing members,
wherein:

the bag feeding device comprises:

a first feeding device provided with bag suction member that adheres to a bag by suction,
a first drive source that causes the bag suction member to swing in a vertical plane between a position where the suction surfaces of the bag suction member is downwardly oriented and a position where the suction surfaces are forwardly oriented, and
a second drive source that causes the bag suction member to rotate in a clockwise and counterclockwise direction through a predetermined angle along the suction surface; and
a second feeding device provided with a transfer chuck that grips the bag,
a third drive source that causes the transfer chuck to move back and forth, and
a fourth drive source that causes the transfer chuck to move in a side-to-side direction, and
a controller controlling the operation of the first through fourth drive sources;

the bag is formed with a slanted bag mouth in a bag width direction in a corner portion at an upper edge thereof; and
as the first through fourth drive sources operate,
the bag suction member of the bag feeding device swing to change the orientation of the bag to a substantially vertical orientation, and rotate so as to cause the bag to rotate through a predetermined angle in the plane of the bag, thereby making the bag mouth substantially horizontal, and
the transfer chuck makes back-and-forth movement, and also moves horizontally along the plane of the bag, thereby making gripping margins on the bag for the pair of left and right grippers substantially equal on left and right sides of the bag.

12. An apparatus for manufacturing spout-equipped bags comprising:

a bag conveying device having a plurality of pairs of right and left grippers that are disposed at equal intervals along a predetermined travel path, intermittently travel along said travel path, and expand or reduce a spacing therebetween along the travel path;
an empty bag storage device disposed in the vicinity of a bag feeding position, which is a stop position along the travel path, and has empty bags placed in a substantially horizontal orientation;
a bag unloading device having unloading suction members that adhere by suction to a bag placed in an empty bag storage device and upwardly unload the bag;
a bag feeding device that receives the bag from the unloading suction members, changes an orientation thereof to a substantially vertical orientation, and feeds the bag to grippers stopped at the bag feeding position;
a bag mouth opening device disposed in the vicinity of a bag mouth opening position, which is a stop position along the travel path, and has a pair of opening suction members positioned facing each other and capable of movement toward and away from each other, and opens a mouth of the bag by adhering by suction the opening suction members to both sides of the bag gripped by the grippers;
a spout inserting/pre-sealing device disposed in the vicinity of a spout inserting/pre-sealing position, which is a stop position along the travel path, and has
a spout insertion member that moves substantially vertically up and down and holds a spout, and
a pair of pre-sealing members positioned facing each other and capable of movement toward and away from each other, and
inserts a spout into the opened bag mouth using the spout insertion member and then pre-seals the spout in the mouth of the bag using the pre-sealing members; and
a permanent sealing device disposed at a permanent spout sealing position, which is a stop position along the travel path, and has a pair of permanent sealing members positioned facing each other and capable movement toward and away from each other, and permanently seals the pre-sealed spout in the bag mouth using the permanent sealing members,
wherein:

the bag feeding device comprises:

a bag holding member, which holds a bag;

a first drive source, which causes the bag holding member to swing in a vertical plane;

a second drive source, which causes the bag holding member to pivot through a predetermined angle in the clockwise and counterclockwise direction along the plane of the bag;

a third drive source, which causes the bag holding member to move back and forth; and

a fourth drive source, which causes the bag holding member to move in a side-to-side direction, and

a controller controlling the operation of the first through fourth drive sources;

switching between

an operation in which a spout is attached to a bag that has a slanted bag mouth formed slanted in a bag width direction in a corner portion at an upper edge thereof, and

an operation in which a spout is attached to a bag that has a parallel bag mouth formed parallel to a bag width direction at an upper edge thereof

is made possible by the controller; and

in a situation in which a spout is attached to the slanted bag mouth, as the first through fourth drive sources operate, the bag holding member of the bag feeding device

swings to change the orientation of the bag to a substantially vertical orientation, rotates so as to cause the bag to rotate through a predetermined angle in the plane of the bag, thereby making the bag mouth substantially horizontal, and

makes back-and-forth movement, and moves horizontally along the plane of the bag,

thereby making gripping margins on the bag for the pair of left and right grippers substantially equal on left and right sides of the bag, and,

in a situation in which a spout is attached to the parallel bag mouth, the first and third drive sources operate, while the second and fourth drive sources are not in operation.

13. An apparatus for manufacturing spout-equipped bags comprising:

a bag conveying device having a plurality of pairs of right and left grippers that are disposed at equal intervals along a predetermined travel

path, intermittently travel along said travel path, and expand or reduce a spacing therebetween along the travel path;

an empty bag storage device disposed in the vicinity of a bag feeding position, which is a stop position along the travel path, and has empty bags placed in a substantially horizontal orientation;

a bag unloading device having unloading suction members that adhere by suction to a bag placed in an empty bag storage device and upwardly unload the bag;

a bag feeding device that receives the bag from the unloading suction members, changes an orientation thereof to a substantially vertical orientation, and feeds the bag to grippers stopped at the bag feeding position;

a bag mouth opening device disposed in the vicinity of a bag mouth opening position, which is a stop position along the travel path, and has a pair of opening suction members positioned facing each other and capable of movement toward and away from each other, and opens a mouth of the bag by adhering by suction the opening suction members to both sides of the bag gripped by the grippers;

a spout inserting/pre-sealing device disposed in the vicinity of a spout inserting/pre-sealing position, which is a stop position along the travel path, and has

a spout insertion member that moves substantially vertically up and down and holds a spout, and

a pair of pre-sealing members positioned facing each other and capable of movement toward and away from each other, and

inserts a spout into the opened bag mouth using the spout insertion member and then pre-seals the spout in the mouth of the bag using the pre-sealing members; and

a permanent sealing device disposed at a permanent spout sealing position, which is a stop position along the travel path, and has a pair of permanent sealing members positioned facing each other and capable movement toward and away from each other, and permanently seals the pre-sealed spout in the bag mouth using the permanent sealing members,

wherein:

the bag feeding device comprises:

a first feeding device provided with bag suction member that adheres to a bag by suction,

a first drive source that causes the bag suction member to swing in a vertical plane between a position where the

suction surfaces of the bag suction member is downwardly oriented and a position where the suction surfaces are forwardly oriented, and
 a second drive source that causes the bag suction member to rotate in a clockwise and counterclockwise direction through a predetermined angle along the suction surface; and
 a second feeding device provided with a transfer chuck that grips the bag, a third drive source that causes the transfer chuck to move back and forth, and
 a fourth drive source that causes the transfer chuck to move in a side-to-side direction, and
 a controller controlling the operation of the first through fourth drive sources;

switching between

an operation in which a spout is attached to a bag that has a slanted bag mouth formed slanted in a bag width direction in a corner portion at an upper edge thereof, and
 an operation in which a spout is attached to a bag that has a parallel bag mouth formed parallel to a bag width direction at an upper edge thereof

is made possible by the controller; and
 in a situation in which a spout is attached to the slanted bag mouth, as the first through fourth drive sources operate, the bag suction member of the bag feeding device

swing and change the orientation of the bag to a substantially vertical orientation, and rotate so as to cause the bag to rotate through a predetermined angle in the plane of the bag, thereby making the bag mouth substantially horizontal, and the transfer chuck makes back-and-forth movement, and also moves horizontally along the plane of the bag, thereby making gripping margins on the bag for the pair of left and right grippers substantially equal on left and right sides of the bag, and

in a situation in which a spout is attached to the parallel bag mouth, the first and third drive sources operate, while the second and fourth drive sources are not in operation.

14. The apparatus for manufacturing spout-equipped bags according to Claim 9, wherein a liquid-filling device provided with an ascending/descending nozzle is installed in the vicinity of a liquid-filling position set between a bag mouth opening po-

sition and a spout inserting/pre-sealing position used as stop positions along the travel path, and said nozzle is inserted into the mouth of a bag gripped by the grippers stopped at the liquid-filling position, and the bag is filled with a liquid substance thereby.

15. The apparatus for manufacturing spout-equipped bags according to Claim 10, wherein a liquid-filling device provided with an ascending/descending nozzle is installed in the vicinity of a liquid-filling position set between a bag mouth opening position and a spout inserting/pre-sealing position used as stop positions along the travel path, and said nozzle is inserted into the mouth of a bag gripped by the grippers stopped at the liquid-filling position, and the bag is filled with a liquid substance thereby.

16. The apparatus for manufacturing spout-equipped bags according to Claim 11, wherein a liquid-filling device provided with an ascending/descending nozzle is installed in the vicinity of a liquid-filling position set between a bag mouth opening position and a spout inserting/pre-sealing position used as stop positions along the travel path, and said nozzle is inserted into the mouth of a bag gripped by the grippers stopped at the liquid-filling position, and the bag is filled with a liquid substance thereby.

17. The apparatus for manufacturing spout-equipped bags according to Claim 12, wherein a liquid-filling device provided with an ascending/descending nozzle is installed in the vicinity of a liquid-filling position set between a bag mouth opening position and a spout inserting/pre-sealing position used as stop positions along the travel path, and said nozzle is inserted into the mouth of a bag gripped by the grippers stopped at the liquid-filling position, and the bag is filled with a liquid substance thereby.

18. The apparatus for manufacturing spout-equipped bags according to Claim 13, wherein a liquid-filling device provided with an ascending/descending nozzle is installed in the vicinity of a liquid-filling position set between a bag mouth opening position and a spout inserting/pre-sealing position used as stop positions along the travel path, and said nozzle is inserted into the mouth of a bag gripped by the grippers stopped at the liquid-filling position, and the bag is filled with a liquid substance thereby.

FIG. 1

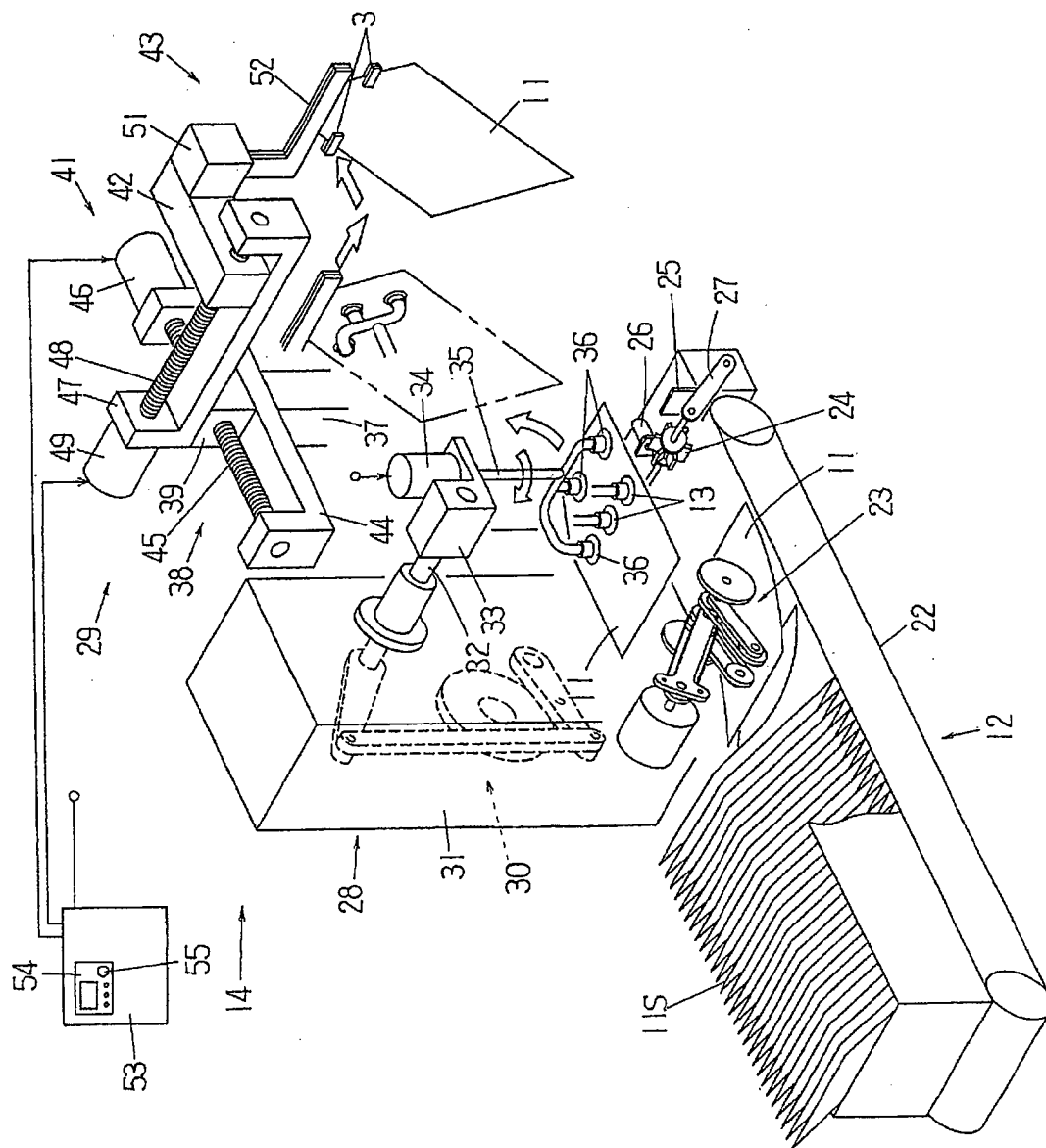


FIG. 2

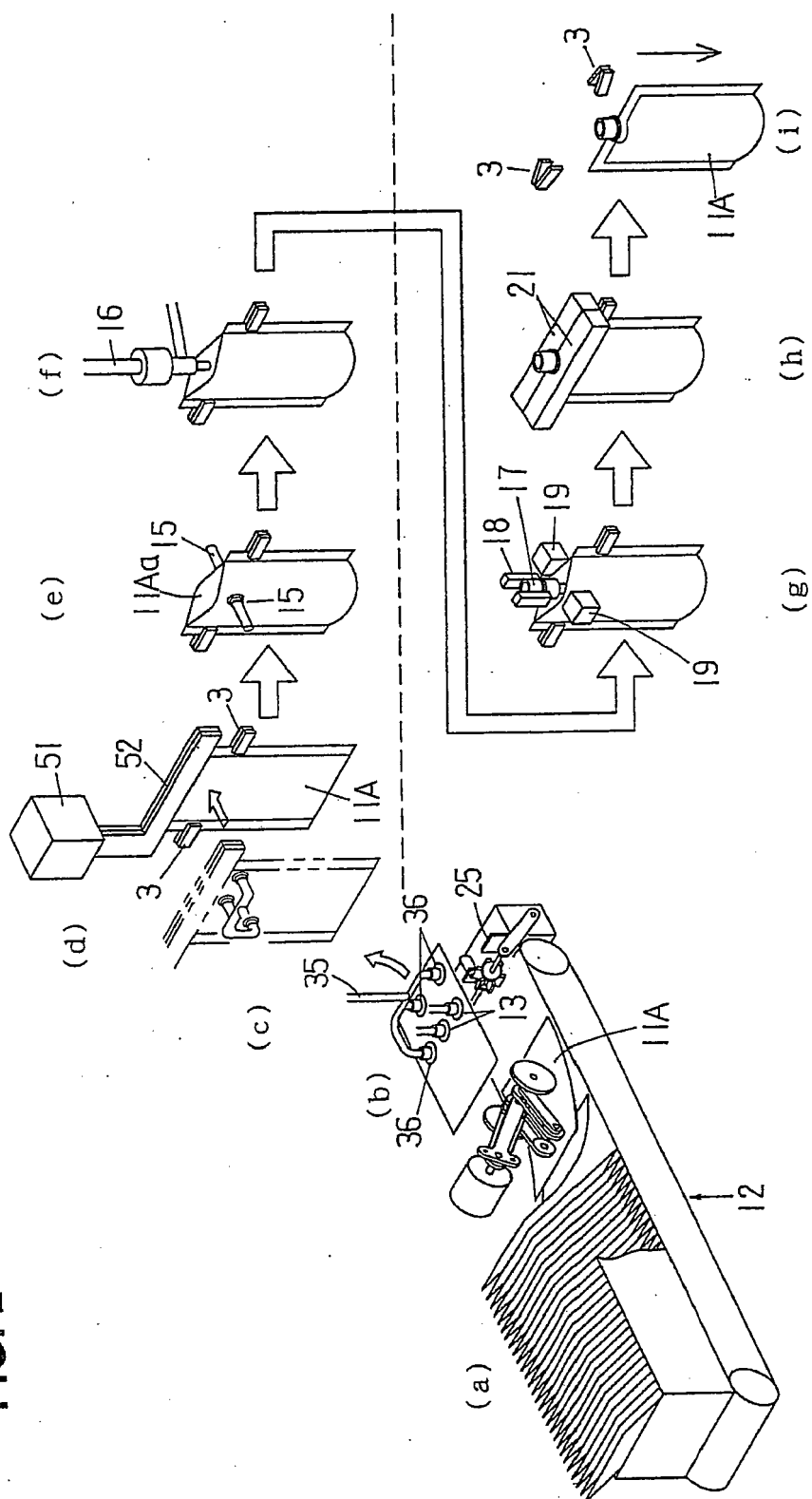


FIG. 3

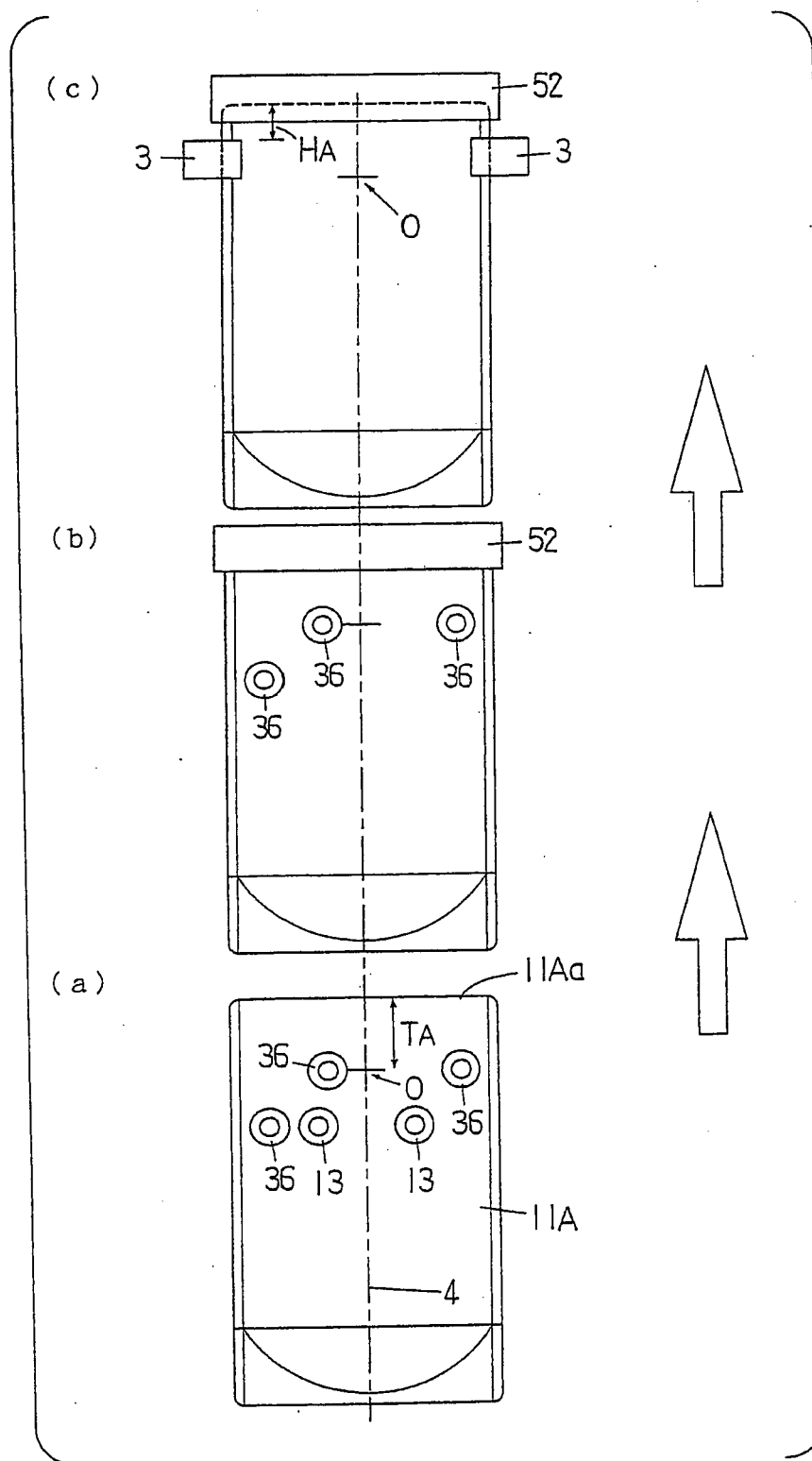


FIG. 4

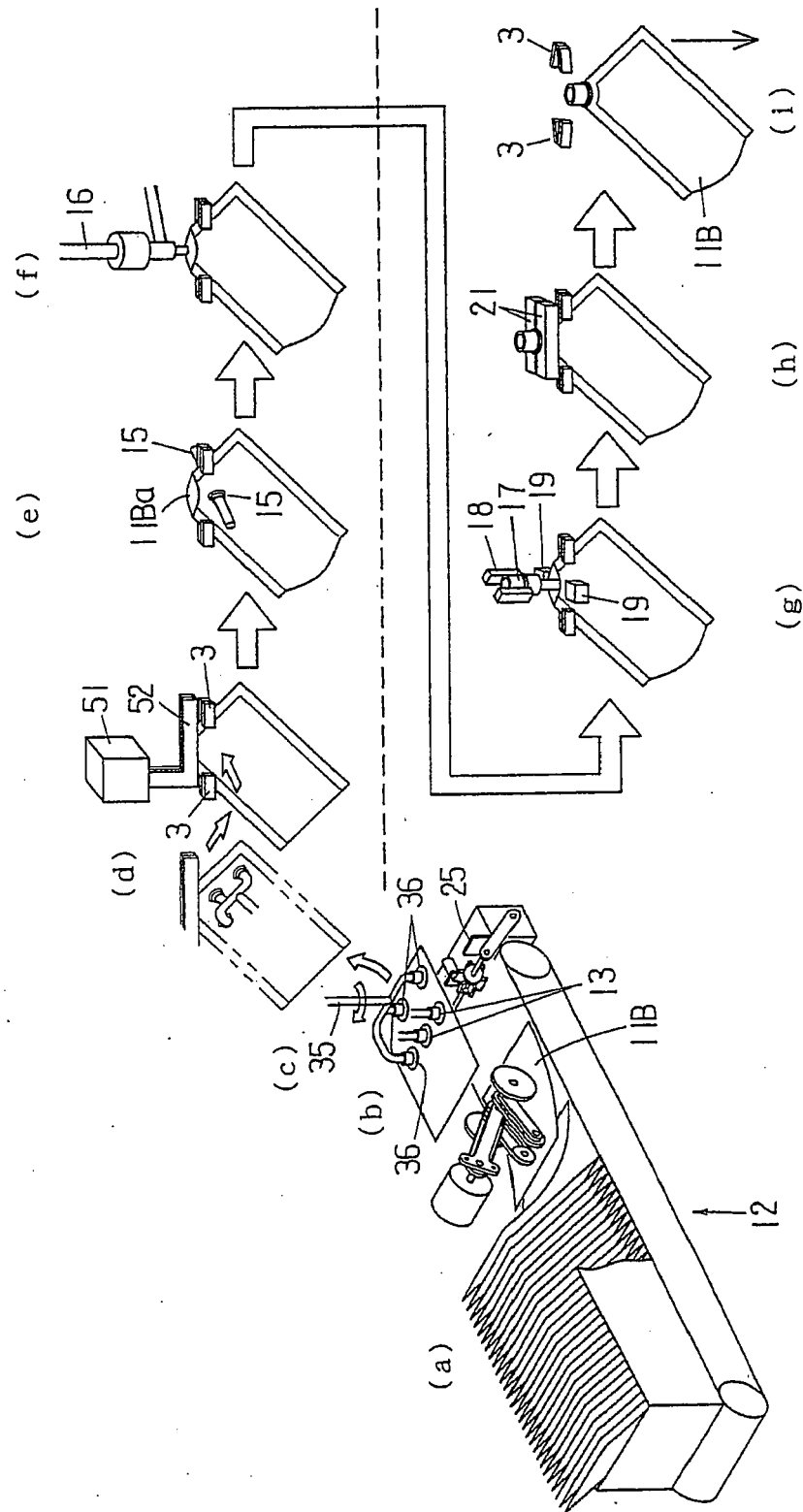


FIG. 5

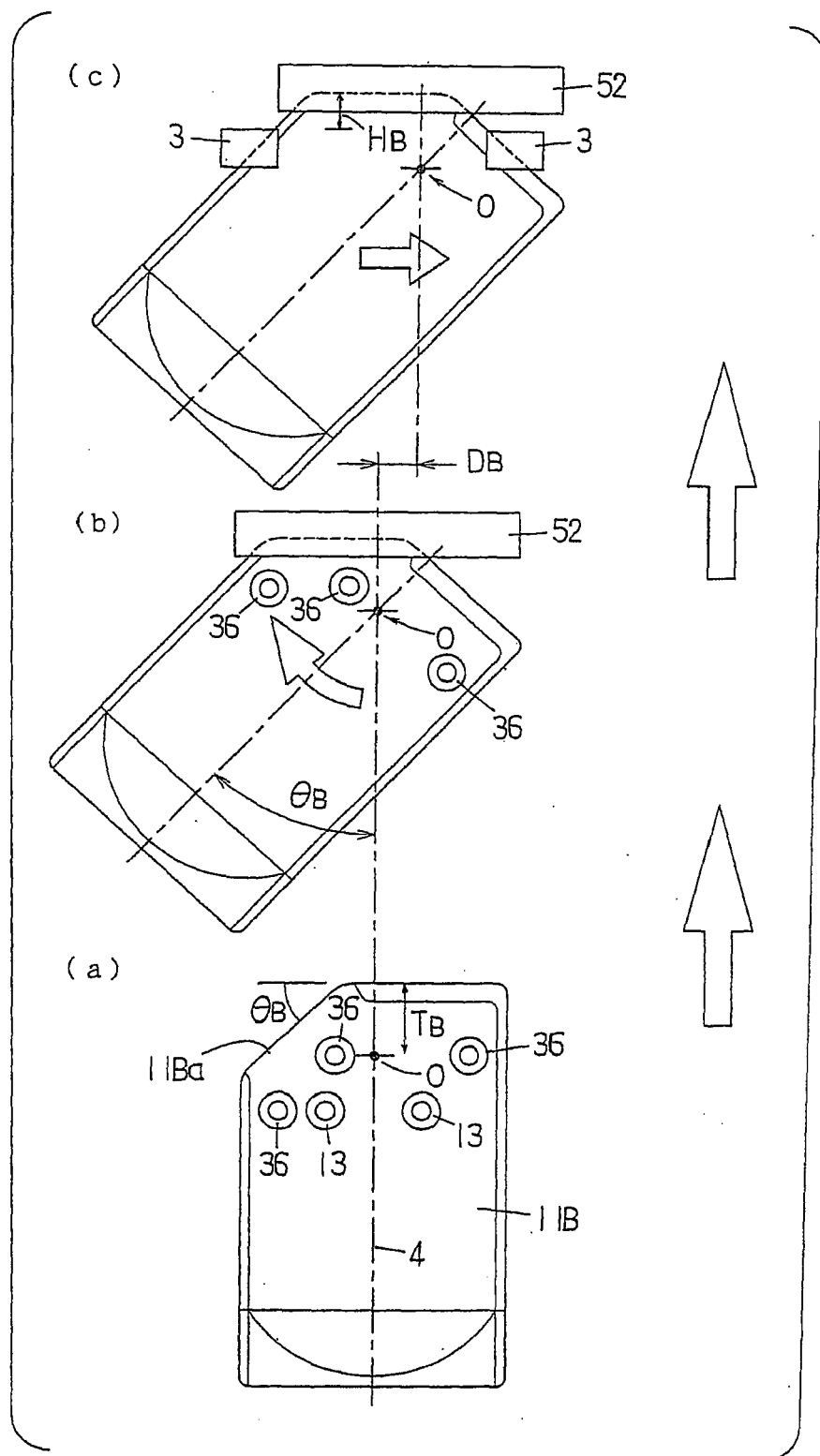


FIG. 6

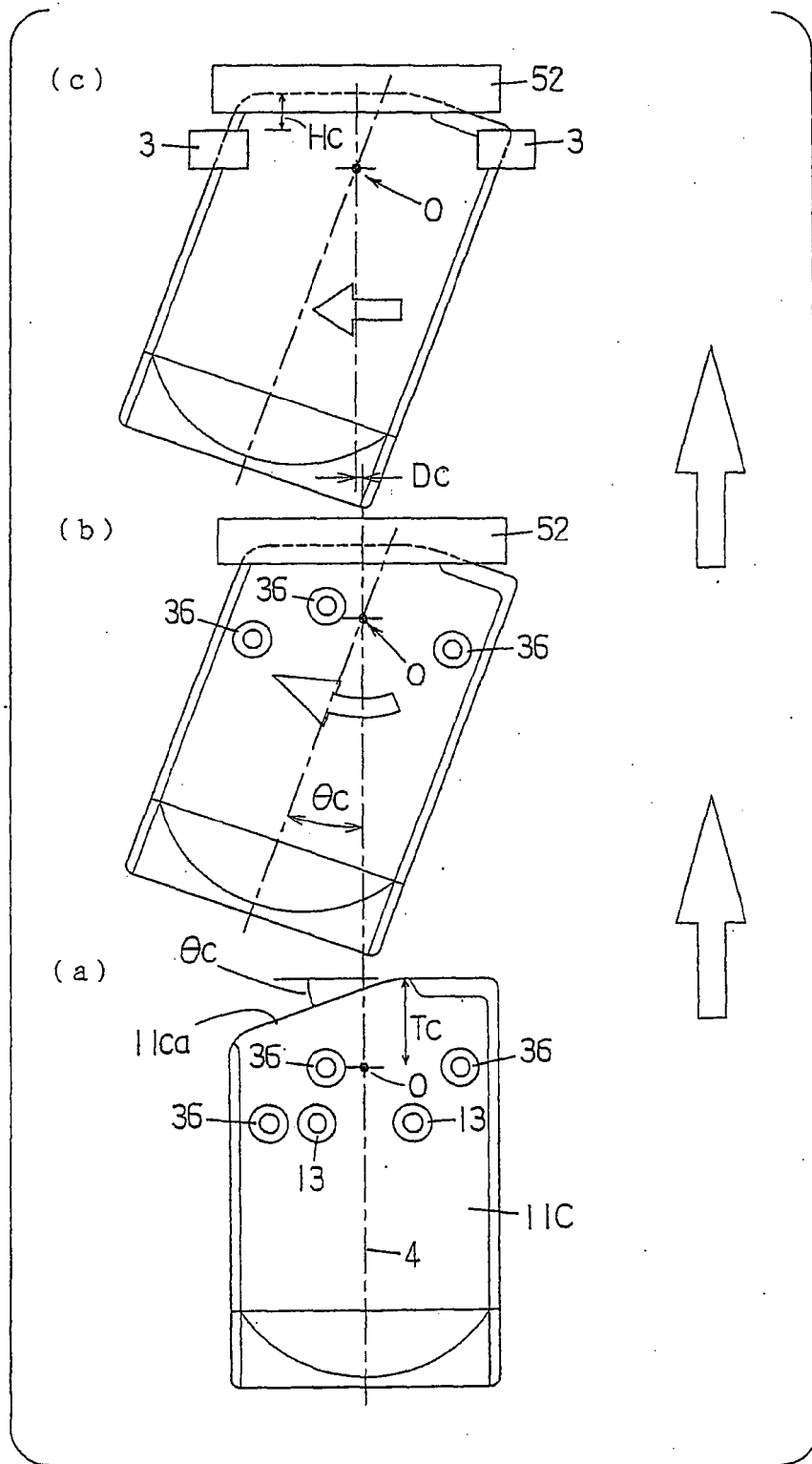
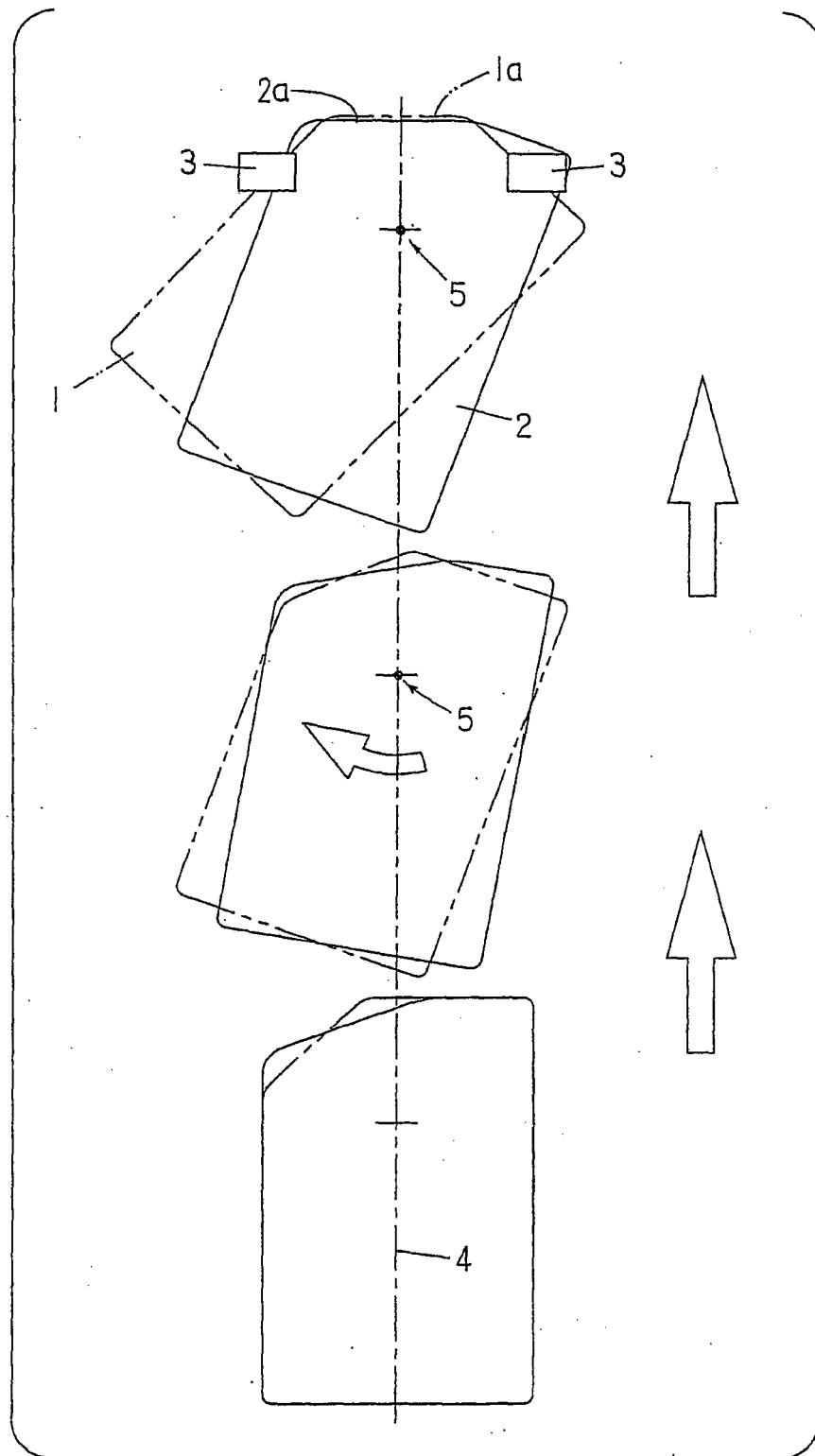


FIG. 7
RELATED ART



REFERENCES CITED IN THE DESCRIPTION

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