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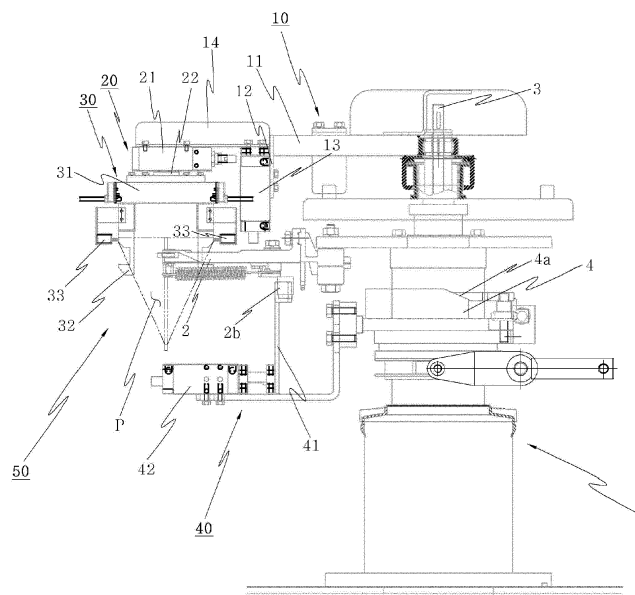
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(54) **Device for converting flat pouch into tetrahedral pouch in rotary packaging machine**

(57) A device for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine including: grippers having gripper jaws and gripper rollers; a rotary shaft; and a barrel cam combined with the rotary shaft and reciprocating for a duration as long as one process of the grippers, with a cam portion provided on an upper part of the barrel cam to control the space between the gripper jaws; the device including: an arm unit combined

with the rotary shaft and performing repeated reciprocation for a duration as long as one process of the rotary packaging machine; a rotary unit mounted to the arm unit; and a pouch clamping unit combined with the rotary unit to be rotated by the rotary unit, the pouch clamping unit clamping opposite sides of the mouth of the pouch while opening the mouth of the pouch inside the pouch.

[FIG. 2]



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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates, in general, to a device for rotary packaging machines, which is installed in a rotary packaging machine without changing the construction of the rotary packaging machine and can convert a rectangular flat pouch into a tetrahedral pouch by processing the pouch such that the upper and lower sealed ends of the pouch cross each other almost perpendicularly.

Description of the Related Art

[0002] Generally, a rotary packaging machine is a machine that produces products through various processes: a pouch opening process for opening the mouth of a pouch while clamping the pouch using grippers; a filling process for filling the interior of the pouch with a material; a sealing process for sealing the mouth of the pouch; and a cooling process for cooling the sealed mouth of the pouch.

[0003] In the related art, examples of conventional rotary packaging machines may be referred to Korean Patent No. 10-0940880 (2010.01.29.) that discloses a packaging machine having a fixed gripper and movable grippers provided on opposite sides of the fixed gripper and functioning to process two supplied pouches simultaneously, and may be referred to Korean Patent No. 10-0465525 (2004.12.29.) that discloses a packaging machine configured to process pouches in such a way that one pouch clamped by a pair of movable grippers is moved through a plurality of processes sequentially and is processed step by step.

[0004] The foregoing is intended merely to aid in the understanding of the background of the present invention, and is not intended to mean that the present invention falls within the purview of the related art that is already known to those skilled in the art.

[0005] Documents of Related Art

(Patent Document 1) Korean Patent No. 10-0940880; and

(Patent Document 2) Korean Patent No. 10-0465525.

SUMMARY OF THE INVENTION

[0006] However, the above-mentioned conventional rotary packaging machines are problematic in that the machines cannot produce tetrahedral pouches in which the upper and lower sealed ends cross each other perpendicularly unless the construction of some elements of the machines is partially changed and a device specified to form the tetrahedral pouches is used in the machines.

chines.

[0007] Accordingly, the present invention has been made keeping in mind the above problems occurring in the related art, and the present invention is intended to propose a device for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine, which can be installed in a conventional rotary packaging machine without requiring a change in the construction of the conventional rotary packaging machine and can function to open and rotate a pouch, thereby efficiently producing tetrahedral pouches and increasing the utility of the conventional rotary packaging machines.

[0008] The present invention is also intended to propose a device for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine, in which a pouch clamping unit is provided in a barrel cam of a conventional rotary packaging machine, so the device can continue the pouch releasing state of the grippers when the pouch is processed in a next process prior to rotating the pouch, thereby reducing the period of processing time required in each process and increasing productivity.

[0009] Therefore, the present invention is advantageous in that the device for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine can be mounted to an arm unit of a conventional rotary packaging machine without requiring a change in the construction of the conventional rotary packaging machine and can function to open and rotate a pouch, thereby efficiently producing tetrahedral pouches and realizing improved economic efficiency and increasing the number of kinds of products that can be produced using rotary packaging machines.

[0010] The present invention is also advantageous in that, when the upper part of a pouch is opened by a pouch opening unit, the movable blades and the actuating pins of the pouch clamping unit can clamp the upper part of the pouch, thereby efficiently clamping the pouch without losing the pouch, and efficiently opening opposite ends of the mouth of the pouch using the movable blades of the pouch clamping unit after inserting the movable blades into the pouch, thus efficiently producing tetrahedral pouches without breaking the pouches.

[0011] A further advantage of the present invention resides in that a gripper opening unit is provided in the device so that gripper jaws can be maintained in a pouch releasing state while the pouch clamping unit clamps the pouch, thereby avoiding interference that may be generated at the time the pouch formed as a tetrahedral shape by the pouch clamping unit is fed to the grippers and efficiently clamping and rotating the pouch simultaneously, and reducing the period of work time.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description when taken in conjunction with the accompanying drawings, in

which:

FIG. 1 is a perspective view illustrating a pouch produced according to the present invention;
 FIG. 2 is a front view illustrating a device for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine according to the present invention;
 FIG. 3 is a plan view of FIG. 2;
 FIG. 4 is a view illustrating the device of the present invention in a state before the device opens the mouth of a pouch;
 FIG. 5 is a view illustrating the device of the present invention in which an arm unit has been moved to an upper position;
 FIG. 6 is a view illustrating the operation of a vertical moving unit of the arm unit in the device of the present invention; and
 FIG. 7 is a view illustrating the operation of movable blades and actuating pins of a pouch clamping unit in the device of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Hereinbelow, an exemplary embodiment of the present invention will be described in detail with reference to the accompanying drawings.

[0014] As shown in FIGS. 2 and 3, a rotary packaging machine 1, in which a device for converting a flat pouch into a tetrahedral pouch according to an embodiment of the present invention is used, includes: a pair of grippers 2 each having a pair of gripper jaws 2a for clamping opposite sides of a pouch P when the pouch P is moved through a plurality of processes, and gripper rollers 2b for operating the gripper jaws 2a so as to clamp or release the pouch P; a rotary shaft 3; and a barrel cam 4 that is combined with the outer circumference of the rotary shaft 3 and is provided with a cam portion 4a in the upper portion thereof, wherein the barrel cam 4 is configured in such a way that, when the grippers 2 of the rotary packaging machine 1 are rotated and it is required to control the space between the grippers 2 within a predetermined section, the barrel cam 4 can reciprocate for a duration as long as one process of the rotary packaging machine so as to control the space between the grippers 2.

[0015] Here, the rotary packaging machine 1 is provided with a vacuum pad mounting unit to open the mouth of a supplied pouch P. Here, the construction and function of the vacuum pad mounting unit may be referred to Korean Patent No. 10-1067454 (2011.09.19.) owned by the applicant of the present invention.

[0016] In the embodiment, although two grippers 2 are provided in the rotary packaging machine 1 such that the grippers 2 form the pair of grippers and can clamp opposite sides of a pouch P as shown in the accompanying drawings, a dual type gripper unit that includes one fixed gripper and two movable grippers provided on opposite

sides of the fixed gripper and can process two pouches P simultaneously may be provided in the rotary packaging machine 1 without being limited to the construction shown in the drawings.

[0017] Here, the rotary shaft 3 of the rotary packaging machine 1 is configured to be rotated at the same angle of rotation as that of the grippers 2 when the grippers 2 are rotated for a duration as long as one process of the rotary packaging machine and to return to an original position thereof when the grippers 2 are stopped.

[0018] Further, the rotary shaft 3 may be configured to be repeatedly rotated at a predetermined angle of rotation and to be moved upward and downward in the same manner as disclosed in Korean Patent No. 10-1345330 (2013.12.19.).

[0019] The device for converting a flat pouch into a tetrahedral pouch in the rotary packaging machine 1 according to the present invention includes: an arm unit 10, a rotary unit 20 and a pouch clamping unit 30.

[0020] Here, the arm unit 10 is combined with the rotary shaft 3 of the rotary packaging machine 1 such that, when the grippers 2 of the rotary packaging machine 1 are moved from a process to another process, the arm unit 10 is rotated at the same angle of rotation as that of the grippers 2 and then returns to an original position thereof

[0021] The arm unit 10 combined with the rotary shaft 3 of the rotary packaging machine 1 includes: an arm 11 extending from the rotary shaft 3 in a horizontal direction toward a position above the grippers 2; a side locking part 12 extending downward from the arm 11; and an upper locking part 14 mounted to the side locking part 12.

[0022] Further, a vertical moving unit 13 functioning to move the upper locking part 14 upward and downward may be provided at a position between the side locking part 12 and the upper locking part 14. In the present invention, the vertical moving unit 13 may be configured as various types, for example, a step motor, a hydraulic or pneumatic cylinder actuator, etc.

[0023] The rotary unit 20 includes: an actuator 21 mounted to the upper locking part 14 of the arm unit 10 at an end thereof; and a rotary body 22 rotated by the actuator 21 in such a way that the rotary unit 20 can be rotated on the central axis of the rotary body 22.

[0024] The actuator 21 may be configured as a rotary actuator.

[0025] The pouch clamping unit 30 is combined with the rotary body 22 of the rotary unit 20 such that the pouch clamping unit 30 can be rotated in opposite directions by a rotation of the rotary body 22.

[0026] The pouch clamping unit 30 includes: an actuator 31; a pair of movable blades 32 that can be moved in opposite directions by the operation of the actuator 31, thereby opening the mouth of a pouch P inside the pouch P that has been opened by a vacuum pad mounting unit (not shown) of the rotary packaging machine 1; and clamps 33 that are provided on opposite sides of the actuator 31 and can clamp opposite sides of the pouch P.

[0027] Here, the movable blades 32 are configured to

be moved in opposite directions such that the blades 32 come together or are spaced apart from each other. Further, the actuator 31 that operates the movable blades 32 may be configured as various types, for example, a step motor, a hydraulic or pneumatic cylinder actuator, etc.

[0028] Further, the clamps 33 are located at positions above the respective movable blades 32, with actuating pins 33a provided to the respective clamps 33 such that the actuating pins 33a can be moved in directions toward the respective movable blades 32. When opposite sides of a pouch P are placed between the actuating pins 33a and the movable blades 32, the actuating pins 33a are operated to clamp the pouch P.

[0029] In the present invention, the rotary packaging machine 1 may further include a gripper opening unit 40.

[0030] The gripper opening unit 40 includes: an operating member 41; and an actuator 42 actuating the operating member 41. Here, when the pouch clamping unit 30 that clamps the pouch P reciprocates by the operation of the arm unit 10, the operating member 41 pressurizes the gripper rollers 2b so as to open the gripper jaws 2a of the grippers 2 that have clamped the pouch P.

[0031] The gripper opening unit 40 is combined with the barrel cam 4 of the rotary packaging machine 1 and can reciprocate in the same manner as that described for the arm unit 10. The actuator 42 of the gripper opening unit 40 is operated such that the gripper jaws 2a of the grippers 2 can be opened after the pouch clamping unit 30 clamps a pouch P and the open state of the gripper jaws 2a can be maintained until the grippers 2 are moved to a next process.

[0032] The operation and effects of the above-mentioned device for converting a flat pouch into a tetrahedral pouch in the rotary packaging machine according to the present invention will be described later herein.

[0033] The device of the present invention is installed in a conventional rotary packaging machine 1 and converts a supplied flat pouch into a tetrahedral pouch in which the upper and lower sealed ends cross each other almost perpendicularly as shown in FIG. 1.

[0034] The device 50 for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine according to the present invention is installed in a conventional rotary packaging machine 1 at a location near the grippers 2 that receive a pouch P and starts to operate after the pouch P is opened by the vacuum pad mounting unit (not shown) of the rotary packaging machine 1.

[0035] In other words, as shown in FIG. 4, the arm unit 10 of the device 50 according to the present invention is placed at a location where a pouch opening process of opening the pouch P using the vacuum pad mounting unit is performed.

[0036] At this time, the movable blades 32 of the pouch clamping unit 30 combined with the arm unit 10 are maintained in a closed state in which the movable blades 32 are closed to each other.

[0037] When a pouch P is supplied to the grippers 2

and the vacuum pad mounting unit opens the mouth of the pouch P, the arm unit 10 is moved downward so that both the rotary unit 20 and the pouch clamping unit 30 can be moved downward as shown in FIG. 5.

[0038] Here, when the arm unit 10 is provided with the vertical moving unit 13, the arm unit 10 can move both the rotary unit 20 and the pouch clamping unit 30 downward while maintaining the downward moving stroke of the conventional arm unit 10 without changing the stroke.

[0039] The clamps 33 are provided with the actuating pins 33a that can be moved in directions toward the respective movable blades 32 as described above. When the pouch P is placed between the movable blades 32 and the actuating pins 33a, the actuating pins 33a are moved toward the respective movable blades 32, thereby clamping the upper part of the pouch P placed between the movable blades 32 and the clamps 33.

[0040] Thus, the movable blades 32 and the clamps 33 of the pouch clamping unit 30 clamp a middle portion of the mouth of the pouch P, and the gripper opening unit 40 is operated to open the grippers 2, thereby releasing the pouch P from the grippers 2. Thus, the pouch P can be prevented from breakage during a rotation of the rotary unit 20 (see FIG. 6).

[0041] After the pouch P is clamped by both the movable blades 32 and the clamps 33 of the pouch clamping unit 30, the movable blades 32 are opened by the actuator 31, thereby opening the mouth of the pouch P. Here, the direction in which the mouth of the pouch P is opened almost perpendicularly crosses the direction in which the lower sealed end of the pouch P extends (see FIG. 7).

[0042] As described above, when a pouch P is supplied to the device of the present invention, the actuating pins 33a of the clamps 33 are moved toward the movable blades 32 until the actuating pins 33a and the movable blades 32 clamp the pouch P. After clamping the pouch P using the actuating pins 33a and the movable blades 32, the mouth of the pouch P is opened by the movable blades 32. Thus, the present invention can efficiently prevent breakage of the pouches P, thereby providing good products and increasing productivity.

[0043] Here, the moving range of the movable blades 32 is determined such that the movable blades 32 can efficiently open the mouth of the pouch P in a direction almost perpendicularly crossing the extending direction of the lower sealed end of the pouch P without breaking the opposite sides of the pouch P. The above-mentioned operation of the movable blades 32 for opening the mouth of the pouch P is performed during a period of processing the opening the pouch P by the pouch clamping unit 30 to a time when the pouch clamping unit 30 reaches a location at which a next process is to be performed.

[0044] When the pouch clamping unit 30 clamping the pouch is moved to the next process while opening the mouth of the pouch P, the grippers 2 of the rotary packaging machine 1 are rotated to the location at which the next process is performed. That is, the grippers 2 of the rotary packaging machine 1 are rotated at an angle of

rotation corresponding to the movement of the pouch clamping unit 30.

[0045] Here, the rotary body 22 of the rotary unit 20 combined with the arm unit 10 is rotated when the arm unit 10 revolves. Described in detail, the opened direction of the mouth of the pouch P which is opened by the movable blades 32 of the pouch clamping unit 30 is perpendicular to an axis extending between the pair of gripper jaws 2a, so the rotary body 22 of the rotary unit 20 is rotated at an angle of 90 degree when the arm unit 10 revolves. Due to the rotation of the rotary body 20, the opened mouth of the pouch which is opened by the movable blades 32 becomes parallel to the axis extending between the gripper jaws 2a, so the pouch can be clamped by the grippers 2.

[0046] Thereafter, the arm unit 10 returns to an original position thereof at which the vacuum pad mounting unit is provided, and repeats the above-mentioned process.

[0047] The present invention may further include the gripper opening unit 40.

[0048] The gripper opening unit 40 is combined with the barrel cam 4 of the rotary packaging machine 1 and is moved for a duration as long as one process of the grippers 2 in the same manner as that described for the arm unit 10.

[0049] In the gripper opening unit 40, the operating member 41 is moved forward by the actuator 42 and comes into contact with the gripper rollers 2b of the grippers 2 of the rotary packaging machine 1, and operates the gripper jaws 2a so as to release the pouch from the gripper jaws 2a. When the grippers 2 are moved to a position of a next process, the operating member 41 of the gripper opening unit 40 is also moved to the position along with the grippers 2 while maintaining the state of the pouch released from the grippers 2. When the gripper opening unit 40 reaches the position of the next process, the operating member 41 and the actuator 42 are operated such that they do not come into contact with the gripper rollers 2b, thereby allowing the grippers 2 to clamp the pouch P. The gripper opening unit 40 can reduce the processing time of the present invention.

[0050] When the present invention does not use the gripper opening unit 40, it is required to add a structure for allowing the grippers 2 to clamp or release the pouch in each of positions of two processes in which the pouch clamping unit 30 is placed.

[0051] When adding the structure for allowing the grippers 2 to clamp or release the pouch in each of the positions of the two processes, the work time is increased due to an increase in the processing time required to clamp or release the pouch using the grippers 2. Especially, in the present invention, the rotary packaging machine 1 performs a plurality of processes while maintaining a constant processing time in each process, so the addition of the structure for allowing the grippers 2 to clamp or release the pouch in each of the positions of the two processes increases the work time and reduces productivity.

[0052] To solve the problems, the present invention provides the gripper opening unit 40 on the outer circumference of the barrel cam 4, so, when the pouch clamping unit 30 clamps a pouch P, the gripper opening unit 40 releases the pouch from the grippers 2 and maintains the state of the pouch released from the grippers 2 until the pouch reaches a position in which a next process is performed. When the pouch P is released from the pouch clamping unit 30 at the position of the next process, the actuator 42 of the gripper opening unit 40 is operated to make the grippers 2 clamp the pouch P. Further, the actuator 42 of the gripper opening unit 40 can be operated to return the gripper opening unit 40 to an original position thereof, thereby efficiently reducing the processing time.

[0053] As described above, the device of the present invention may be efficiently used by simply adding the device in a conventional rotary packaging machine 1 without changing the construction of the rotary packaging machine, so the present invention is advantageous in that it does not increase the production cost of the rotary packaging machine. Further, another advantage of the present invention resides in that the device can prevent a breakage of a pouch P due to the operation of the movable blades 32 and the clamps 33 of the pouch clamping unit 30, and can easily and efficiently change the orientation of the pouch P, thereby efficiently converting a flat pouch into a tetrahedral pouch in which the upper and lower sealed ends cross each other almost perpendicularly.

[0054] Although a preferred embodiment of the present invention has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

Claims

1. A device for converting a flat pouch into a tetrahedral pouch in a rotary packaging machine, the rotary packaging machine comprising: grippers (2) each having gripper jaws (2a) for clamping a pouch (P) and gripper rollers (2b) for actuating the gripper jaws (2a); a rotary shaft (3); and a barrel cam (4) combined with the rotary shaft (3) such that the barrel cam can reciprocate for a duration as long as one process of the grippers, the barrel cam (4) provided with a cam portion (4a) on an upper part thereof to control a space between the gripper jaws (2a); the device comprising:

an arm unit (10) combined with the rotary shaft (3) of the rotary packaging machine (1) and performing repeated reciprocation for a duration as long as one process of the rotary packaging machine (1);
a rotary unit (20) mounted to the arm unit (10);

and

a pouch clamping unit (30) combined with the rotary unit (20) such that the pouch clamping unit can be rotated by the rotary unit, the pouch clamping unit clamping opposite sides of a mouth of the pouch (P) supplied thereto while opening the mouth of the pouch (P) inside the pouch (P). 5

claim 5, wherein the actuator (42) of the gripper opening unit (40) is operated to be moved while continuously pressurizing the gripper rollers (2b) of the grippers (2) of the rotary packaging machine (1) until the gripper opening unit (40) reaches a next process.

2. The device for converting the flat pouch into the tetrahedral pouch in the rotary packaging machine of claim 1, wherein the arm unit (10) includes: 10

an arm (11) combined with the rotary shaft (3) of the rotary packaging machine (1); 15
a side locking part (12) combined with the arm (11); and
an upper locking part (14) combined with both the side locking part (12) and the rotary unit (20). 20

3. The device for converting the flat pouch into the tetrahedral pouch in the rotary packaging machine of claim 2, wherein the arm unit (10) further includes:

a vertical moving unit (13) combined with the side locking part (12), the vertical moving unit vertically moving upward and downward the upper locking part (14) combined with the rotary unit (20). 25

4. The device for converting the flat pouch into the tetrahedral pouch in the rotary packaging machine of claim 1, wherein the pouch clamping unit (30) includes: 30

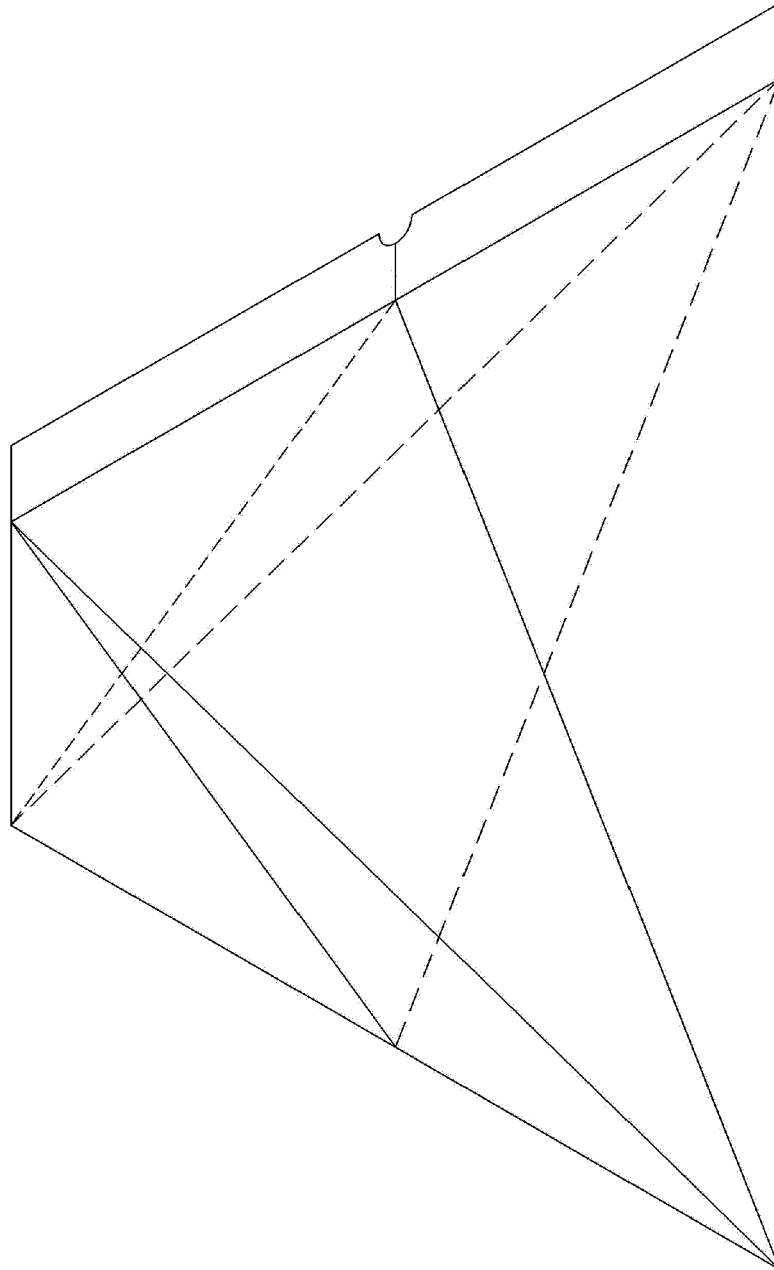
an actuator (31) combined with the rotary unit (20) such that the actuator can be rotated by the rotary unit (20); and 35
a pair of movable blades (32) moved to left and right by the actuator (31) such that the blades (32) open the mouth of the pouch (P) inside the pouch (P). 40

5. The device for converting the flat pouch into the tetrahedral pouch in the rotary packaging machine of claim 1, wherein the barrel cam (4) of the rotary packaging machine (1) further includes: 45

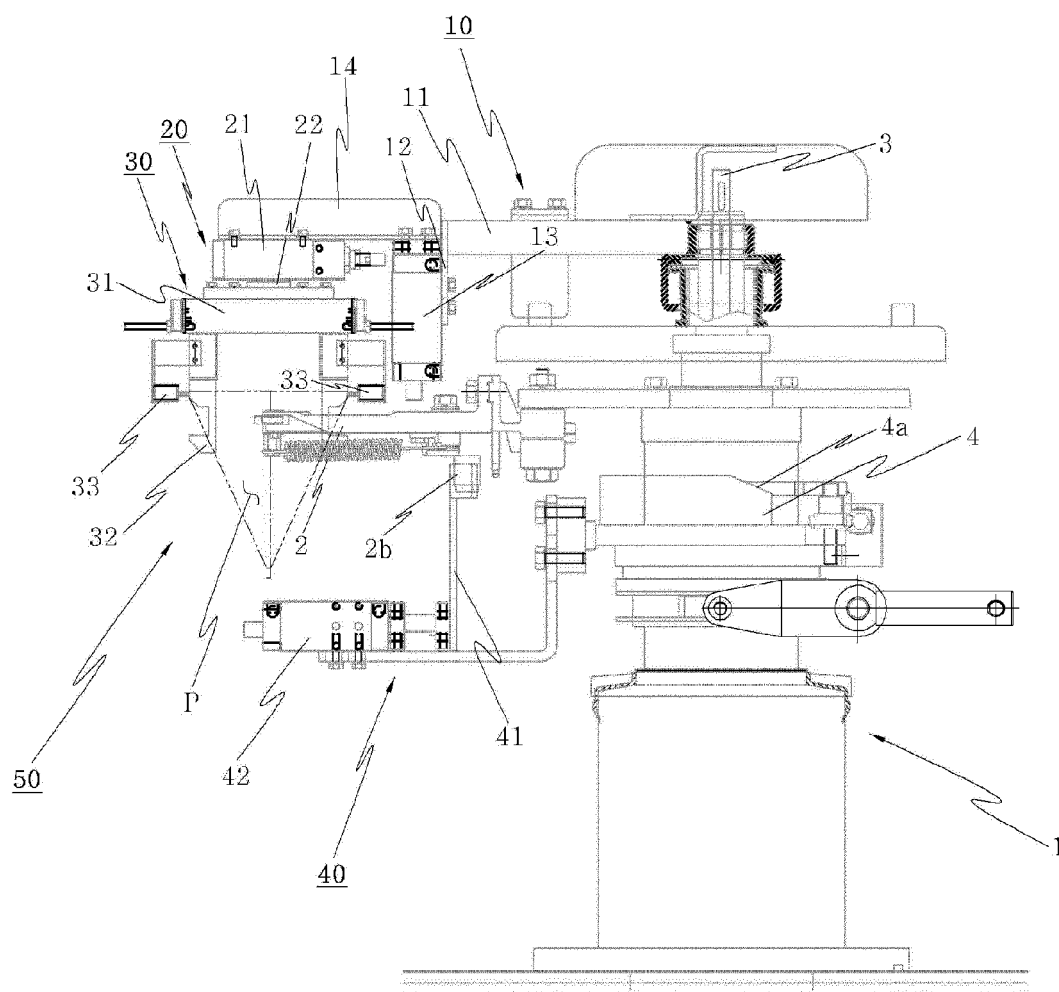
a gripper opening unit (40) including: 50
an operating member (41) for pressurizing and releasing the gripper rollers (2b) of the grippers (2); and
an actuator (42) for actuating the operating member (41). 55

6. The device for converting the flat pouch into the tetrahedral pouch in the rotary packaging machine of

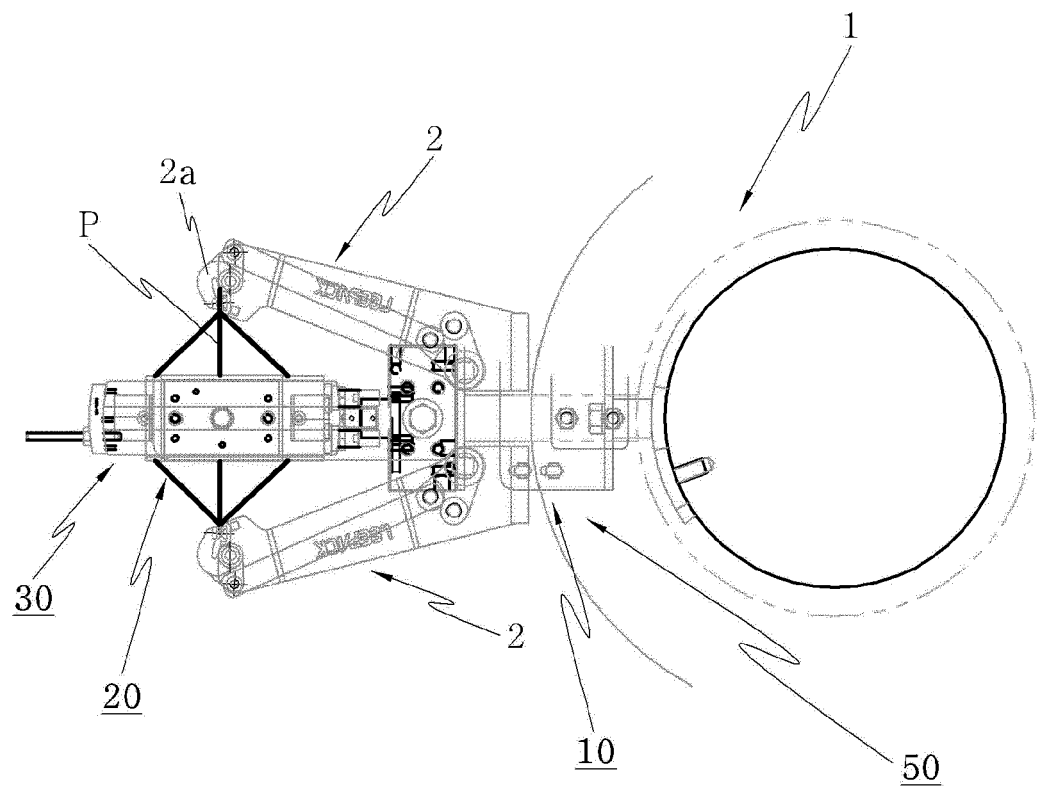
【FIG. 1】



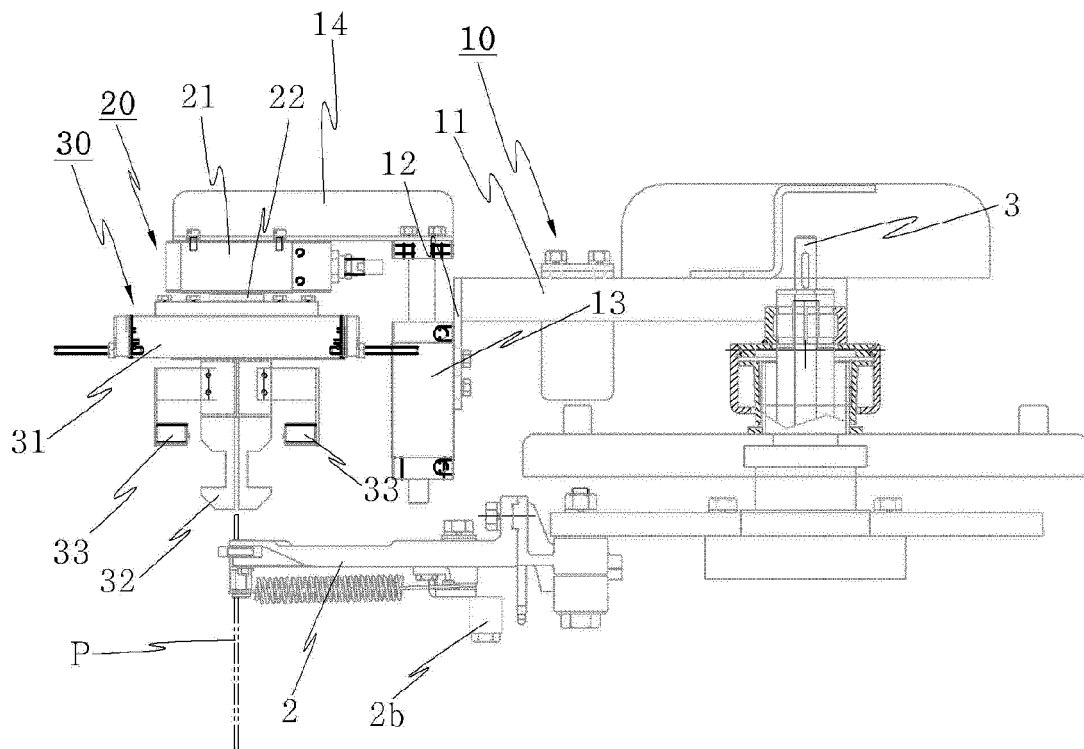
【FIG. 2】



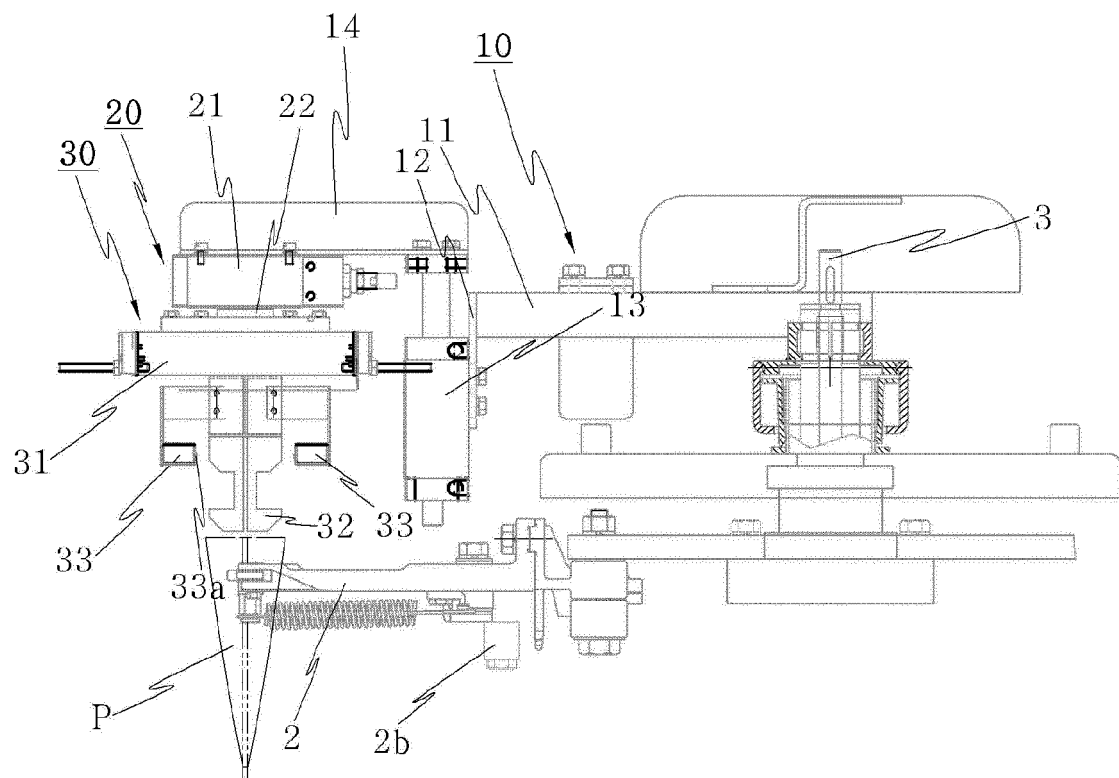
【FIG. 3】



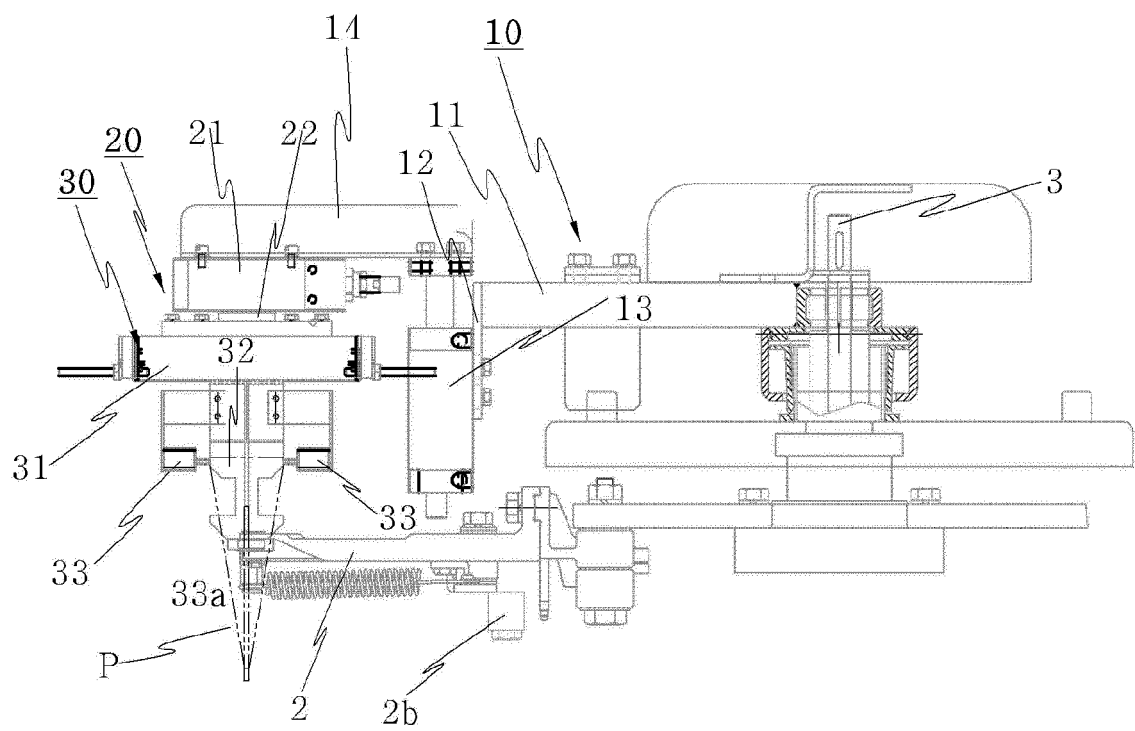
【FIG. 4】



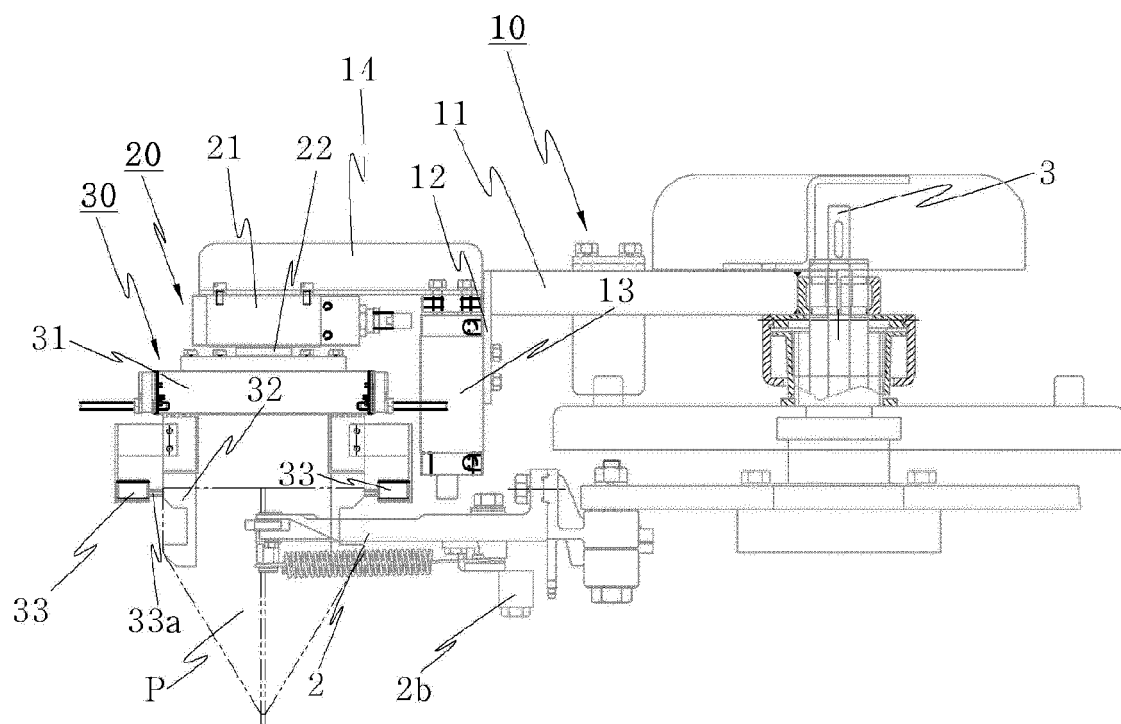
【FIG. 5】



【FIG. 6】



【FIG. 7】





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