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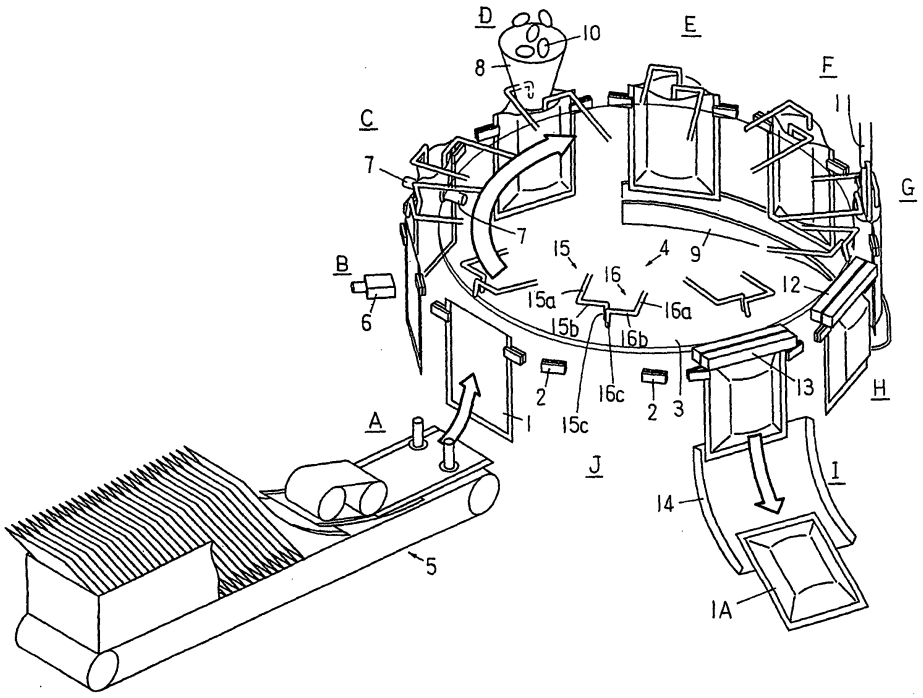
(54) Bag-filling packaging machine

(57) A bag-filling packaging machine in which supplied bags (1) are gripped by pairs of grippers (2) disposed on the periphery of an intermittently turning round table (3), and the bags, at stopping positions, are successively subjected to prescribed packaging operations with the gas inside the bags being replaced during that process, wherein a pair of guide members (15) and (16) for keeping the bag mouth opened is provided on the table (3) in correspondence with each of the gripper pair, and guide members (15) and (16) are connected to an inactive gas supply source and have gas blow-out ports at the tip ends that are inserted inside the bags, thus allowing the guide members (15) and (16) to not only keep the bag mouth opened but also function as gas blow-in nozzles.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a bag-filling packaging machine that includes pairs of grippers for holding supplied bags and holding them in a prescribed attitude, successively performs various packaging operations, including opening the bag mouths, filling the bags with the contents to be packaged, and sealing the bag mouths, and further replaces the gas inside the bags during the process.

2. Description of the Related Art

[0002] Bag-filling packaging machines generally perform, during the packaging process, the insertion of a gas blow-in nozzle into the bags through the bag mouths, and the replacement of the air inside the bags with an inactive gas (such as nitrogen gas, for example). There are three major systems that are currently known to execute these tasks.

(1) Stationary System: This system is typically employed in an intermittently moving type of rotary bag-filling packaging machine. In this system, a gas blow-in nozzle that ascends and descends is provided at one or a plurality of stopping positions, the gas blow-in nozzle is inserted into a bag that is moved to and stopped at such a position(s), the gas inside the bag is replaced by gas blow-in nozzle, and then the nozzle is extracted, as disclosed in, for instance, Japanese Patent Application Laid-Open (Kokai) No. H7-313128.

(2) Following System: This system is typically used in a continually moving type (including rotary type) of bag-filling packaging machine. In this system, one or a plural number of gas blow-in nozzles that ascend and descend is/are provided so as to be capable of moving reciprocally a prescribed distance along the path of bag movement, the gas blow-in nozzle or nozzles are inserted into the bags and perform gas replacement while moving synchronously with and in the same direction as the bags, and then the gas blow-in nozzle or nozzles are extracted at the end of the movement and returned to the original position thereof, as disclosed in, for instance, Japanese Patent Application Laid-Open (Kokai) Nos. 2002-326604 and 2005-255236.

(3) Synchronous System: An intermittently revolving type of rotary bag-filling packaging machine typically employs this system. In this system, gas blow-in nozzles are provided, corresponding respectively to a plurality of pairs of grippers installed at the periphery of a table, the gas blow-in nozzles are, within a prescribed segment or segments, inserted into the bags and perform gas replacement and then are extracted at prescribed positions, as disclosed in, for instance, Japanese Patent Application Laid-Open (Kokai) Nos. 2004-67224 and 2005-35610. By synchronous system is meant a system in which devices used for packaging operations (the gas blow-in nozzles, in this case) are installed, in correspondence, respectively, with the plurality of pairs of grippers, and such devices are set to be moved together with (synchronized with) the grippers.

[0003] Of the three systems described above, the synchronous system has advantages in that the gas blow-in time period can be made comparatively longer, and gas blow-in can be conducted continuously over that entire time period, and as a result, the gas inside the bags can be replaced more assuredly and stably. With the gas blow-in time period made longer, production efficiency need not be compromised.

[0004] However, in the apparatus of the above-described Japanese Patent Application Laid-Open (Kokai) No. 2004-67224, the gas blow-in nozzles are attached below the hoppers; accordingly, the system of this prior art can be applied only in a bag-filling packaging machine in which a hopper is provided for each gripper pair. Also, the degree of freedom of packaging operations is impaired, and it is thus not possible, for example, to insert another member inside a bag after the bag has been filled. More specifically, for example, there are cases where, depending on the type of contents to be filled and the size of the bags, it is desirable, at a stopping position after filling, to insert different gas blow-in nozzles into a bag and perform additional gas blow-in, or to insert a nozzle for filling with a liquid substance. However, the hoppers get in the way in doing such an operation, and it is thus not possible to insert another member inside a bag once a bag has been filled.

[0005] In the apparatus of Japanese Patent Application Laid-Open (Kokai) No. 2005-35610, the insertion of the gas blow-in nozzles into the bags is done after filling the bags with the contents to be packaged (solid substance). Accordingly, compared to the system disclosed in Japanese Patent Application Laid-Open (Kokai) No. 2004-67224, the time period that gas blow-in can be executed is shorter, and, also, the air that was inside the bags prior to the filling with the contents to be packaged is trapped in the contents to be packaged during filling, and such air can possibly remain "as is" without being subject to be replaced at all. As a result, the assurance and stability of the gas replacement are somewhat inferior.

BRIEF SUMMARY OF THE INVENTION

[0006] Accordingly, the object of the present invention is to provide a bag-filling packaging machine that performs gas replacement assuredly and in a stable fashion.

[0007] More specifically, the object of the present in-

vention is to provide a bag-filling packaging machine that includes a plurality of pairs of grippers for gripping the edges of both sides of supplied bags and suspendingly holding the bags, at equal intervals along a horizontal endless bag conveyance path, so as to revolvingly move the pairs of grippers in one direction, either continuously or intermittently in each of the such intervals, and so as to successively perform various packaging operations, such as opening the bag mouths, filling the bags with the contents to be packaged, and sealing the bag mouths, on the bags held by the pairs of grippers; and in this type of packaging machine, the present invention assuredly and stably performs gas replacement, without compromising production efficiency, and without impairing the degree of freedom in the packaging operations.

[0008] The above object is accomplished by a unique structure of the present invention for a bag-filling packaging machine that includes a plurality of pairs of grippers for respectively gripping the edges of both sides of each of the supplied bags and suspendingly holding each bag, the plurality of pairs of grippers being disposed at equal intervals along a horizontal endless bag conveyance path and revolvingly moved in one direction either continuously or intermittently in each of the intervals, and the bag-filling packaging machine successively performing on the bags held by the grippers various packaging operations including opening the bag mouths, filling the bags with the contents to be packaged, and sealing the bag mouths; and in the present invention:

the bag-filling packaging machine further includes pairs of guide members that are, respectively, correspondingly provided to the pairs of grippers, are revolvingly moved together with the pairs of grippers and are moved with a predetermined timing between a wait position and a bag mouth holding position that is below the wait position;

each of the pairs of guide members has guide portions at the tip ends thereof, the guide portions being positioned outside the bag mouths when they are in the wait position and being inserted into the bags through the opened bag mouths when they are in the bag mouth holding position, the guide portions mutually opened and closed (or be moved toward and away from each other) with a predetermined timing so that when opened the guide portions hold the bag mouth in a prescribed open shape; and

the guide members are of hollow bodies, so that the guide members function as gas replacement nozzles (in addition to functioning to keep the bag mouth open), the hollow interiors make gas flow passageways, and gas passage openings are formed in the guide portions.

[0009] In the above-described structure of the present invention, the guide members are hollow bodies comprised of tubular bodies or plate-form bodies, and the hollow interiors make gas flow passageways and connected to a gas supply source and/or vacuum source. These guide members have gas passage openings (gas blow-in ports or blow-in ports) at their tip ends or at other suitable places. A pair of such guide members constitute one set, so that they are mutually opened and closed (separation-proximity) with predetermined timing.

[0010] Of each pair of guide members, one guide member is either connected to a gas supply source such that gas supply can be made or stopped , or is connected to a gas supply source and a vacuum source in an interchangeable manner and such that gas supply and vacuum can be made or stopped ; and the other guide member is either connected to a gas supply source such that gas supply can be made or stopped , or is connected to a gas supply source and a vacuum source such that the connection can be switched and such that gas supply and vacuum can be made or stopped , respectively, or further is connected to a vacuum source such that vacuum can be made or stopped. In other words, in the present invention, both guide members are connected to a gas supply source, or both of them are connected to a gas supply source and a vacuum source interchangeably, or one guide member is connected to a gas supply source and the other guide member is connected to a vacuum source. It is preferable that the guide member which is connected to the gas supply source is adjustable for its gas blow-in pressure.

[0011] In the present invention, furthermore, the guide portions of the guide members, when mutually closed (so as to be next to each other), are preferably positioned proximally in such a manner that they are aligned directly in line with a direction of movement of the guide portions and are inserted into a bag in the closed state. When the two guide portions are in the closed state inside a bag, the two guide portions are positioned proximally, aligned in the bag width direction at a position substantially in the center of the bag width direction. In this case, however, the positions of the guide portions are slightly shifted in the bag width direction from the center of the width of the bag.

[0012] Furthermore, the guide portions of the pair of guide members, when they are open and close inside a bag, are moved in mutually opposite directions along circular arc-shaped paths, respectively, in a horizontal plane; and it is preferable that these circular arc-shaped paths be established so that each, in its middle portion, approaches the center of the bag width direction. When the guide portions of the guide members mutually are opened inside a bag, such guide portions, as they are moved, along the circular arc-shaped paths, at first approach the center of the bag width direction and then, continuing on, again moved farther away from the center of the bag width direction. The distance between the opened (separated) guide portions is set so that, when the bag size is small, the guide portions stop when they are moved a short distance along the circular arc-shaped paths and when the bag size is large, the guide portions stop when they are moved a long distance along the cir-

cular arc-shaped paths.

[0013] The bag-filling packaging machines of the present invention can be provided with filling hoppers. More specifically, a single filling hopper which is used for a plurality of pairs of grippers, as in the above-described Japanese Patent Application Laid-Open (Kokai) No. 2005-255236, can be installed at a filling position; or, alternatively, a plurality of filling hoppers which correspond respectively with each one of plurality of pairs of grippers, as in the above-described Japanese Patent Application Laid-Open (Kokai) No. 2004-67224, can be provides so that such filling hoppers are revolvingly moved together with the corresponding pairs of grippers.

[0014] The filling hopper(s) is moved with a predetermined timing between the wait position and the lower insertion position, which is provided below the wait position, and is positioned outside the bag mouth in the wait position and is inserted into the bag through the opened bag mouth in the insertion position. The timing of the insertions of the filling hopper(s) is earlier than the filling of the contents to be packaged into the bag(s), and the filling hopper(s) returns to the wait position with appropriate timing after the filling of the contents into the bag completes. The above-described pair of guide members are moved down to the bag mouth holding position before the filling hopper(s) is inserted into the bag, then the guide members are inserted into the bag, and then they are mutually opened (separated) so as to hold the bag mouth opened. The guide members are moved upward after the hopper has ascended.

[0015] The present invention is applicable to bag-filling packaging machines of the intermittent movement type (a type in which bags held by grippers are moved intermittently, and packaging operations are performed when the bags are stopped and/or when they are moving as seen in the above-described Japanese Patent Application Laid-Open (Kokai) Nos. H7-313128, 2005-255236, 2004-67224 and No. 2005-35610). The present invention is applicable also to bag-filling packaging machines of the continuous movement type (a type in which bags held by grippers are moved continuously, and packaging operations are performed during that movement as disclosed in the above-described Japanese Patent Application Laid-Open (Kokai) No. 2002-326604) and is further applicable to the endless track type bag-filling packaging machines (a type in which pairs of grippers are installed on a limitless track such as a chain, and bags are conveyed along an endless bag conveyance track as seen in the above-described Japanese Patent Application Laid-Open (Kokai) No. 2002-326604). The present invention is further applicable to bag-filling packaging machines of the rotary type (a type in which pairs of grippers are installed in a rotating table, and bags are conveyed along a circular bag conveyance track as disclosed in the above-identified Japanese Patent Application Laid-Open (Kokai) Nos. H7-313128 and 2005-255236, 2004-67224 and No. 2005-35610).

[0016] As seen from the above, in the bag-filling packaging machine of the present invention, guide members are provided so as to correspond respectively to the pairs of grippers, the guide members are designed so that they not only function to keep the bag mouth opened but also function as gas replacement nozzles, the gas replacement time period is set to be long, over which entire time period it is possible to continuously perform blow-in of an inactive gas or the like into the bags and, as necessary, air removal and gas replacement for the bags is performed assuredly and stably for all of the bags. With the guide members that function as bag mouth opener and also function as gas replacement nozzles, gas replacement can be performed without making the relevant structures overly complex.

[0017] Furthermore, in the bag-filling packaging machine of the present invention, one of the two guide members can be connected to a vacuum source, or, alternatively, one or both of the two guide members is or are connected to a gas supply source and a vacuum source interchangeably (or so that switching therebetween is possible). Accordingly, blowing in of the gas into the bags and the vacuuming out (removal) of air (gas) from the inside of the bags can be done simultaneously or in an alternating manner.

[0018] In addition, in the present invention, the guide member connected to the gas supply source can be designed so that the gas blow-in pressure is adjustable. Thus, the blow-in volume during gas blowing into the bags can be adjusted. Accordingly, gas blow-in and air removal (vacuuming) can be appropriately combined, or the gas blow-in intensity can be suitably altered, so that gas replacement can be performed in an optimal pattern depending upon the type of the contents to be filled or upon the size of bags.

[0019] In the present invention, the guide portions of the pair of (or two) guide members are opened and closed (separation-proximity) in the interior of each bag, and the positions of the guide portions are preferably set so that, when in the closed state, the two guide portions of the pair of (or two) guide members are positioned close to each other and aligned in the bag width direction substantially at the center of the bag mouth. As a result, the space occupied by the two guide portions in the direction perpendicular to the bag width direction is small or narrow; and as a consequence, when the distance between the gripper pair (or the distance between two grippers) is widened and the bag mouth is thus tensioned (pulled) laterally to the left and right with the guide members in the bag, the opening in the bag mouth becomes very narrow; as a result, the inflow of outside air into the bag and the outflow of gas from the bag interior are limited, and thus improved gas replacement can be executed.

[0020] Depending on the type of contents to be filled, there would be cases that gas replacement continues with the bag mouth opened by the guide members during a prescribed time period even after the contents filling process has finished. In such cases, when the bag mouth opening condition changes due to the situations that the

contents to be packaged are filled or due to swaying or vibration during bag conveyance, then gas replacement is not adequately effected for some bags. However, in the present invention, since the bag mouth is kept in a prescribed opened shape by the guide portions of the guide members, gas replacement is performed in the same manner on any bag whatever.

[0021] In the present invention, further, both guide portions which are closed inside a bag are shifted in the bag width direction from the bag width center position and thus they are not exactly at the center of the bag mouth in terms of the width of the bag. Accordingly, when the two guide portions are open (separation) or close (proximity), when they are moved linearly in a direction perpendicular to the bag width direction as in the conventional opening members, the opened bag mouth would be distorted in the shape of a parallelogram, and such distortion would be relatively larger for the bag is small in width. In the present invention, in cases that the guide portions are close to each other, side by side, in the bag width direction at substantially the center of the opened bag mouth and then moved in mutually opposite directions along the circular arc-shaped paths, respectively, in a horizontal plane, and such circular arc-shaped paths are established so that both of them, in the middle, approach the center in the bag width direction, then when the bag width size is small, the movement distance of the guide portions is small, and the opening guide portions will approach the vicinity of the bag width center along the circular arc-shaped paths of the guide portion, and as a result, the distortion in the opened bag mouth will be suppressed. When the bag width size is large, the guide movement distance is large, and the opening guide portions, after approaching the vicinity of the bag width center, are again moved away from the vicinity of the bag width center along the circular arc-shaped paths. Thus, though distortion might appear in the opened bag mouth, it will not be much of a problem.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0022]

Figure 1 shows a bag-filling packaging machine according to one embodiment of the present invention;
Figure 2 is a lateral cross-section of the main components of the bag-filling packaging machine;
Figure 3 is an enlarged view of the left half thereof;
Figure 4 is an enlarged view of the right half thereof;
Figure 5 is a top view of the main components of the bag-filling packaging machine;
Figure 6 is a cross-sectional view taken along the line 6-6 in Figure 2;
Figure 7 is a side view of the main components in a guide mechanism of the bag-filling packaging machine;
Figure 8 shows the positions and movement paths of the guide portions opened (shown in solid lines) and closed (shown in imaginary lines) inside a bag having a larger bag width size;
Figure 9 shows the positions and movement paths when the guide portions are opened (shown in solid lines) and closed (shown in imaginary lines) inside a bag having a smaller bag width size;
Figure 10 shows a bag-filling packaging machine according to another embodiment of the present invention;
Figure 11 shows the positional relationship between a gas replacement nozzle and guide portions inside a bag;
Figure 12 shows the manner of connecting the guide members to two gas supply sources;
Figure 13 shows the manner of connecting the guide members to a gas supply source and a vacuum source; and
Figure 14 shows the manner of connecting the guide members to a gas supply source and a vacuum source (equipped with a gas composition analysis indicator).

DETAILED DESCRIPTION OF THE INVENTION

[0023] The bag-filling packaging machine of the present invention will be described below in detail with reference to Figure 1 to 13.

[0024] In the rotary type bag-filling packaging machine shown in Figure 1, a plurality of pairs of grippers 2 for respectively gripping the left and right edge on both sides of a bag 1 and suspending that bag are provided at equal intervals about the periphery of a round table 3 that revolves intermittently (the arrow indicating the turning direction). In addition, guide mechanisms 4 (only the guide members 15 and 16 thereof are shown in Figure 1) for keeping the bag mouth opened are provided on the table 3 so as to correspond, respectively, to each pair of grippers 2.

[0025] At process positions (A to J) about the periphery of the table 3 are provided: a conveyor magazine type bag feeder 5 at position A; a printing device (a printer 6 only is shown) at position B; a bag mouth opener (suction plates 7 only are shown) at position C; a device for supplying the contents to be packaged (a hopper 8 only is shown) at position D; bag bottom tapping devices 9 at positions E to G, and a gas replacement (gas blow-in) nozzle 11 at position G; a gas removal press device (not shown) and a sealing device (hot plates 12 only are shown) at position H; and further, a cold sealing device (cooling plates 13 only are shown) and a product discharging chute 14 are provided at position I. Position J is an idle position.

[0026] The guide mechanism 4 includes guide members 15 and 16 that are bent metal pipes; and in addition, metal pipes of slightly smaller diameter that are formed in bent shapes are attached to the tip ends of the guide members 15 and 16 (see Figure 5). The guide members

(or two guide members) 15 and 16 function as one set.

[0027] The guide members 15 and 16 respectively comprise, as seen from Figure 1, arm portions 15a and 16a that extend outward in substantially a radial direction from the center of the table 3, link portions 15b and 16b mutually bent inward, and guide portions 15c and 16c that are at the tip ends of the guide members 15 and 16 and oriented downward. The guide portions 15c and 16c are inserted into bags as will be described below. The hollow interiors of the guide members 15 and 16 are gas flow passageways communicating to a gas supply source (not shown), while the lower ends of the guide portions 15c and 16c are formed with openings that make gas blow-out ports. In other words, the guide members 15 and 16 function as gas replacement nozzles (gas blow-in nozzles) in addition to function to keep the bag mouth opened.

[0028] The guide members 15 and 16 are movable (swing) simultaneously in the up-and-down directions with a predetermined timing (Figure 2 shows the moved-down guide members 15 and 16 on the left side and moved-up guide members on the right side). As a consequence, the guide portions 15c and 16c at the tip ends of the guide members 15 and 16 are moved in the up-and-down directions along longitudinal circular arc-shaped paths and also moved in mutually opposite directions along substantially radial directions in the table 3 in a horizontal plane (along horizontal circular arc-shaped paths that will be described subsequently), so that the guide portions 15c and 16c mutually open (when moved away from each other) and close (when moved toward each other).

[0029] The operation of the bag-filling packaging machine shown in Figure 1 is now described.

[0030] At position A, bags 1 are supplied from the conveyor magazine type bag feeder 5 to a stopped gripper pair 2, and each bag 1 is held by the pair of grippers 2. At position B, printing is performed on the surface of the bag 1 by the printer 6.

[0031] At position C, the bag 1 is opened by the suction plates 7 that come in touch with the side surfaces of the bag 1 (at which time the distance in the gripper pair 2 are narrowed), then the guide members 15 and 16 that were until then in the upper position (wait position) swing downward (to the bag mouth holding position that is the at the height (level) of the grippers 2), the guide portions 15c and 16c that were in positions above the bag 1 are brought into the bag, and moreover, the guide members 15 and 16, with a timing that is slightly delayed from the swinging downward thereof, are moved in mutually opposite directions along substantially radial direction of the round table 3, so that the guide portions 15c and 16c, that were closed until then, are opened (or separated). In other words, in the course of the guide members 15 and 16 moving down from the wait position to the bag mouth holding position, the guide portions 15c and 16c begin to open (moved away from each other), and then open completely (separated from each other) in the bag mouth holding position, and keep the bag mouth in a prescribed opened shape. In addition to this bag mouth opening action, gas blow-in into the bag is begun from the lower ends (gas blow-out ports (openings)) of the guide portions 15c and 16c. Meanwhile, after the guide portions 15c and 16c have opened (or separated from each other in the radial direction of the table), the suction plates 7 stop sucking the side surfaces of the bag and are moved away from the bag 1.

[0032] At position D, the hopper 8 descends from above, a wait position, toward the bag mouth held in an open shape by the guide members 15 and 16, and the lower end of the hopper 8 is inserted, at an insertion position, into the bag mouth, and then the contents 10 to be packaged are dumped into the hopper 8, so that the interior of the bag 1 is filled with the contents, and then the hopper 8 is raised back to its wait position. Meanwhile, while moving from position C to position D, gas blow-in into the interior of the bag continues to be performed, so that gas replacement progresses inside the bag.

[0033] At position E and position F, tapping of the bag bottom is done simultaneously with gas blow-in so as to eliminate bridges in the contents inside the bag, so that gas replacement is promoted. While moving from position D to position E and from position E to position F, gas blow-in into the interior of the bag continues, and gas replacement further progresses inside the bag.

[0034] Then, at position G, a gas replacement nozzle 11 is lowered, and its flat tip end is inserted into the bag 1 through the gap that is formed between the guide portions 15c and 16c. After the tip end of the gas replacement nozzle 11 has been inserted, the guide members 15 and 16 immediately swing upward (swinging upward to such degree as not to bump against the gas replacement nozzle 11), so that the guide portions 15c and 16c are extracted from the bag. Then the distance between the grippers 2 widens, tensioning the bag mouth to the left and right and pulling the bag mouth laterally in opposite directions, thus closing the bag mouth. With the bag mouth thus closed, gas blow-in into the bag is performed by the gas replacement nozzle 11. When gas blow-in is done, as described above, by the guide members 15 and 16, gas replacement is performed with the bag mouth opened by the guide portions 15c and 16c; as a result, there will be a possibility that air outside the bag will intrude in the vicinity of the bag mouth. Accordingly, in order to effect more complete gas replacement, it is preferable that gas blow-in be performed with the bag mouth closed, using the gas replacement nozzle 11. After performing gas blow-in for a prescribed time period by the gas replacement nozzle 11, the gas replacement nozzle 11 is moved upward and is extracted from the bag 1. At this point, the distance between the pair of grippers 2 is widened further, so that the bag mouth of the bag 1 is tensioned to the left and right and the bag mouth is closed completely.

[0035] At position H, together with gas removal by pressing, the bag mouth is sealed by the hot plates 12;

and at position I, the sealed bag mouth is cooled by the cooling plates 13. Then, the gripping by the grippers 2 is released, and the finished bag 1A drops onto the product discharging chute 14 and is discharged to the outside of the packaging machine.

[0036] The configuration and functions of the bag-filling packaging machine described above are, with the exception of the guide mechanism 4, generally known.

[0037] The specific structure of the bag-filling packaging machine, particularly the guide mechanism 4, will be described below with reference to Figure 2 to 7.

[0038] As seen from Figures 2 to 4, the round table 3 is secured to an intermittently turning shaft 21 that is linked to a drive source (not shown) and intermittently turns a prescribed angle at a time. The grippers 2 are provided on the lower surface of the table 3, and they close (to hold the bag) and then open (to release the bag) with a predetermined timing in conjunction with the turning of the table 3. On the upper surface of the table 3, a plurality of support column pairs 22 are provided upright in correspondence with the pairs of grippers 2 (Figures 2 and 3 show only support column 22), respectively; and between a pair of the support columns 22, as best seen from Figure 2, a first (lower) parallel link mechanism 23 and a second (upper) parallel link mechanism 24 are provided.

[0039] The first parallel link mechanism 23 includes, as best seen from Figure 3, links 25 and 26. One end of each of the links 25 and 26 is rotatably connected to and shaft-supported by the support columns 22, and the other end of each of the links 25 and 26 is connected to a first (lower) linking member 27. On the inner radial side of the linking member 27, a cam roller 28 is rotatably attached. The links 25 and 26 of the first parallel link mechanism 23 are always maintained in parallel.

[0040] In the description of the present specification, by "inner radial side" is meant the side toward (closer to) the center of the table 3; and by "outer radial side" is meant the side opposite therefrom. Thus, in, for instance, Figure 3, the right side of the linking member 27 is the inner radial side, and the left side of the linking member 27 is the outer radial side.

[0041] The second parallel link mechanism 24 likewise includes links 29 and 30; and one end of each of the links 29 and 30 is rotatably connected to and shaft-supported by the support columns 22, and the other end of each of the links 29 and 30 is connected a second (upper) linking member 31. On the inner radial side of the linking member 31, a cam roller 32 is attached so as to be rotatable. The links 29 and 30 of the second parallel link mechanism 24 are always maintained in parallel.

[0042] On the outer radial side of the link 26 of the first parallel link mechanism, an attachment plate 33 is secured; and, on this attachment plate 33, a third parallel link mechanism 34 is provided. As best seen from Figure 5, the third parallel link mechanism 34 comprises links 35 and 36 and attachment block members 37 and 38. The center part of each of the links 35 and 36 is rotatably connected to and shaft-supported by the attachment plate 33, and both ends of the links 35 and 36 are rotatably linked to the attachment block members 37 and 38. The links 35 and 36 and the attachment block members 37 and 38 are respectively always mutually maintained in parallel. To the attachment block members 37 and 38 are secured to the base portions of the guide members 15 and 16, respectively.

[0043] In addition, a pin 39 is secured to the lower part of the link 36 (see Figure 7), and a tension spring 41 is mounted between the pin 39 and one of the support columns 22, so that the tension spring 41 urges the guide members 15 and 16 in direction that they are closed (or are moved toward each other).

[0044] The link 26 of the first parallel link mechanism 23 is rotatably shaft-supported between two support columns 22 by a support shaft 42 (see Figure 3) that is secured to that link 26, and the lower end of a lever 43 is rotatably connected to the support shaft 42 outside the support columns 22. To a shaft 44 (see Figure 6) secured to the upper end of the lever 43, one end of a linking rod 46 is attached through a joint 45 capable of turning and tilting relative to the shaft 44; and to a shaft 47 (see Figure 7) erected on the upper surface of the link 36 of the third parallel link mechanism 34, the other end of the linking rod 46 is attached, through a joint 48 capable of turning and tilting relative to that shaft 47. To the shaft 44, moreover, a free roller 49 is attached so as to be rotatable.

[0045] The link 29 of the second parallel link mechanism 24 is rotatably shaft-supported between the support column pair 22 by a support shaft 51 that is secured to that link 29, and the upper end of a lever 52 is secured to the support shaft 51 outside the support columns 22. The lower end of the lever 52 is capable of contacting the free roller 49 from the outer radial side, so that, when the lower end of the lever 52, overcoming the spring (urging) force of the tension spring 41, presses against the free roller 49 from the inner radial side, the guide members 15 and 16 are opened (or moved away from each other).

[0046] In the center of the intermittently turning shaft 21, a reciprocating turning shaft 53 is provided. The reciprocating turning shaft 53 is reciprocally turned (or turned forward and reverse directions) with a predetermined timing by a drive source (not shown). In other words, when the intermittently turning shaft 21 turns, the reciprocating turning shaft 53, in synchronization therewith, turns (turns forward) for precisely the same angle as that of the intermittently turning shaft 21; and, when the intermittently turning shaft 21 stops, the reciprocating turning shaft 53 turns back in the reverse direction for the same angle, returning to the original position.

[0047] To this reciprocating turning shaft 53 is secured a first cylindrical cam 54. The first cylindrical cam 54 has a downward facing cam surface in the outer circumference thereof, against which the cam roller 28 of the first parallel link mechanism 23 is in contact constantly. When the reciprocating turning shaft 53 turns (in reverse direc-

tion) so as to return, it activates, at the process positions C and G, the first parallel link mechanism 23, so that the guide members 15 and 16 are made to swing in the up-and-down direction.

[0048] To the reciprocating turning shaft 53, a second cylindrical cam 55 is attached so that the second cylindrical cam 55 is in a fixed condition in the turning direction (so as not to be rotatable on the shaft 53) and is capable of ascending and descending. Accordingly, the second cylindrical cam 55 is, in the turning direction of the reciprocating turning shaft 53, moved together with the first cylindrical cam 54. The second cylindrical cam 55 has an upward facing cam surface in the outer circumference thereof, and the cam roller 32 of second parallel link mechanism 24 is in contact constantly with this cam surface. Thus, when the reciprocating turning shaft 53 turns (in reverse direction) so as to return, it activates, at the process positions C and H, the second parallel link mechanism 24, so that the guide members 15 and 16 are opened (moved away from each other) and closed (moved toward each other) by the third parallel link mechanism 34.

[0049] To the upper surfaces of each support column pair 22, an upper table 56 is secured; and the center of the upper table 56 is, as seen from Figure 2, supported by the reciprocating turning shaft 53 via a bearing 50. To the center of the upper table 56, a large gear 57 is rotatably attached; and with the periphery of the large center gear 57, as seen from Figure 5, four small gears 58 of the same size are meshed. Shafts 59 of the small gears 58 (one shaft is referred to by the reference numeral 59a as shown in Figure 3) are supported by bearings 61 (see Figure 2) so as to be rotatable in the upper table 56. At the lower ends of the shafts 59 (and 59a), male threads are formed, and to each of which is screwed a nut member 62. To the nut members 62, adjustment rollers 63 are rotatably attached. The adjustment roller 63 is provided on the inner radial side of the nut member 62 and is fitted into a channel-shaped engagement part 64 formed in the second cylindrical cam 55.

[0050] Of the four shafts 59, only the shaft 59a protrudes above the upper table 56, and a handle 65 is attached to its upper end. When the handle 65 is turned, all of the small gears 58 meshed with the large center gear 57 are turned, and all of the shafts 59 are turned and the nut members 62 ascend and descend, so that the second cylindrical cam 55 ascends and descends. When the second cylindrical cam 55 ascends and descends, the second parallel link mechanism 24 is operated, so that the degree of opening (the distance between the guide portions 15c and 16c when maximally opened) of the guide members 15 and 16 is changed via the lever 52, the linking rod 46, and the third parallel link mechanism 34.

[0051] On the upper surface of the upper table 56, switchover valves 66 are provided so as to correspond to each pair of the guide members 15 and 16. A piping connected to the gas supply source and to a filter (which are not shown) is provided in the interior of the reciprocating turning shaft 53 and branched out onto the upper table 56, and the branched pipes 67 of the piping are connected to the switchover valves 66; and further, the switchover valves 66 and guide members 15 and 16 are connected by flexible tubes 68.

[0052] Next, the operation of the guide mechanisms 4 of the bag-filling packaging machine will be described.

[0053] At positions A and B, when the table 3 is in its stopped state, the attachment plate 33 is in its upward tilted position (see Figure 4), the guide members 15 and 16 are raised in the wait position, and the guide portions 15c and 16c are closed. Right after the table 3 stops, the reciprocating turning shaft 53 turns so as to return, but the guide members 15 and 16 are neither moved up and down nor open or close.

[0054] When table 3 is turned and stopped at position C, the reciprocating turning shaft 53 turns so as to return. When the reciprocating turning shaft 53 thus turns to return, the cam roller 28 is raised along the cam surface of the first cylindrical cam 54, and the first parallel link mechanism 23 operates, so that the attachment plate 33 that has been tilted returns to the horizontal position, and the guide members 15 and 16 that until then has been in the upward wait position are moved (swing) down to the bag mouth holding position. Also, the cam roller 32 is raised along the cam surface of the second cylindrical cam 55, and the second parallel link mechanism 24 operates, so that the lever 52 swings to the inner radial side toward the reciprocating turning shaft 53, so that the linking rod 46 is moved to the inner radial side, the third parallel link mechanism 34 operates overcoming the spring (urging) force of the tension spring 41, the guide members 15 and 16 are moved mutually opposite directions, and the guide portions 15c and 16c that had been closed until then are opened (separated).

[0055] In terms of timing, as described earlier, the guide portions 15c and 16c begin opening in the course of the guide members 15 and 16 moving down from the wait position to the bag mouth holding position, and then are completely opened after the guide members 15 and 16 reach the bag mouth holding position, thus keeping the bag mouth in the prescribed opened condition. At this point in time, by the operation of the switchover valve 66, gas blow-in starts through the lower ends (or at the gas blow-in ports) of the guide portions 15c and 16c.

[0056] At positions D to F, as seen from Figure 5, the guide members 15 and 16 are in the bag mouth holding position "as is" and the guide portions 15c and 16c are open (separated).

[0057] At position G, when the revolving table 3 is stopped, the guide members 15 and 16 remain in the bag mouth holding position, and the guide portions 15c and 16c are still opened. After the table 3 stops, the reciprocating turning shaft 53 turns so as to return. At this point, however, with a timing that is immediately after the gas replacement nozzle 11 is inserted into the bag 1, the cam roller 28 descends along the cam surface of the first cy-

lindrical cam 54, the first parallel link mechanism 23 operates, the attachment plate 33 tilts upward from the horizontal position, and the guide members 15 and 16 that were in the downward bag mouth holding position until then are moved (swing) upward. During the course of the turning of the reciprocating turning shaft 53 so as to return, the cam roller 32 that moves along the cam surface of the second cylindrical cam 55 neither ascends nor descends, the second parallel link mechanism 24, accordingly, does not operate, and the lever 52 does not move either. In conjunction with the tilting of the attachment plate 33, with the free roller 49 pressed against the lever 52, the angle subtended by the attachment plate 33 and the lever 43 becomes smaller; and as a result, the linking rod 46 assumes a form in which it is pushed in the outer radial direction, relatively, the third parallel link mechanism 34 operates, the guide members 15 and 16 are moved, and the guide portions 15c and 16c are closed slightly to such degree as will not interfere with the gas replacement nozzle 11.

[0058] At position H, when the table 3 is stopped, the guide members 15 and 16 are in the wait position, and the guide portions 15c and 16c remain opened though not completely. After the table 3 stops, when the reciprocating turning shaft 53 turns so as to return, the cam roller 32 that moves along the cam surface of the second cylindrical cam 55 descends, the second parallel link mechanism 24 operates, and the lever 52 swings largely in the outer radial direction. As a result, the contact between the lever 52 and the free roller 49 is eliminated, the third parallel link mechanism 34 is activated by the spring (urging) force of the tension spring 41, and the guide portions 15c and 16c are closed completely. At positions I and J, this condition is maintained.

[0059] As illustrated clearly in Figure 8, when the guide portions 15c and 16c of the guide members 15 and 16, respectively, are in the closed condition (indicated by the imaginary lines) in the bag 1 at, for instance, position C, the guide portions 15c and 16c, at positions substantially in the center in the bag width direction (the center in the bag width direction is shown by line 71), are positioned proximally, aligned in the bag width direction, on the line 72 joining the gripping parts (or two side edges of the bag 1) of the grippers 2. The individual positions of each of the guide portions 15c and 16c, as shown in detail in Figure 8, are set so that the guide portion 16c is positioned so as to be slightly shifted, from the bag width center position (line 71), to the right, while the guide portion 15c is positioned so as to be slightly shifted, from the bag width center position, to the left.

[0060] Since the guide portions 15c and 16c are positioned proximally and aligned in the bag width direction, when the distance between the grippers 2 is widened and the bag mouth is tensioned to the left and right and closed, the opening of the bag mouth becomes very small. When gas replacement is performed in this condition, the inflow of outside air into the bag and the outflow of gas inside the bag are limited, so that high gas replacement efficiency is assured.

[0061] The guide members 15 and 16 are linked to the both ends of the third parallel link mechanism 34; accordingly, when the guide portions 15c and 16c opened and closed inside the bag 1, the guide portions 15c and 16c are moved, as seen from Figure 8, with a revolving symmetry in mutually opposite directions along the circularly arc-shaped tracks (the arc-shaped tracks being indicated, respectively, by the lines 73 and 74) in a horizontal plane. The guide members 15 and 16 (including the guide portions 15c and 16c) after their opening movements are shown by solid lines in Figure 8. When the guide portions 15c and 16c are in the closed condition, the guide portions 15c and 16c are positioned so as to be mutually crossing, having passed beyond the center line 71, respectively; or the guide portions 15c and 16c are off the center (center line 71) but on the line 72 connecting the two side edges of the bag 1). Accordingly, both circularly arc-shaped tracks 73 and 74 take the curvature shape that, when the guide portions 15c and 16c open, first approaches the center (line 71) in the bag width direction, and, after reaching substantially the center, moves away from the center (line 71). When the guide portions 15c and 16c close, they follow the paths that are the reverse thereof.

[0062] The positions of the guide portions 15c and 16c in the closed state are the same even for bags of different width sizes, but the distance in which the guide portions 15c and 16c are parted changes appropriately as necessary. In other words, the distance between the opened guide portions 15c and 16c is set so that when the bag width size is small, the guide portions 15c and 16c stop after they are moved a short distance along the above-described circularly arc-shaped tracks and so that when the bag width size is large, then they stop after they are moved a long distance along the circularly arc-shaped tracks.

[0063] Figure 8 shows a situation that the distance of movement of the guide portions 15c and 16c when opened is comparatively large, and the guide portions 15c and 16c are at some distance from the center (line 71) in the bag width direction; and thus in Figure 8, distortion is developed in the opened shape of the bag mouth (asymmetrically relative to the line 72). However, since the bag width size is large, distortion will not be much of a problem for receiving the hopper 8.

[0064] On the other hand, when the bag width size is small as shown in Figure 9, the distance of movement of the guide portions 15c and 16c when they are opened is small. As a result, the guide portions 15c and 16c are stopped in the vicinity of the center (line 71) of the bag width (or stopped at the halfway through the circularly arc-shaped tracks 73 and 74), and the shape of the opening in the bag mouth is nearly diamond-shaped, being the shape that is substantially symmetrical relative to the line 72.

[0065] Furthermore, in the right half of Figure 2 (and in Figure 4), the guide members 15 and 16 in the wait

position are sprung up far above the bag 1. In actual operation, however, they need only be moved upward to such a distance that they do not to interfere with the hot plates 12 and the cooling plates 13.

[0066] The above-described bag-filling packaging machine, moreover, can be modified in the following manner, for instance:

(1) In the above description, a single hopper is provided in position D. However, as described in Japanese Patent Application Laid-Open (Kokai) No. 2004-67224, for example, a plurality of hoppers can be provided on the intermittently turning table 3, so that they can move up and down, corresponding, respectively, to the pairs of grippers 2.

(2) In the structure described above, the guide members are operated when the table 3 is in stopped state, by causing the two cylindrical cams 53 and 54 to move in a reciprocating manner. However, it is also possible to make the cylindrical cams stationary and make the guide members operate while the table 3 is turning.

(3) In the example described above, the table 3 is turned intermittently. However, it can be turned continuously.

(4) In the embodiment described above, the pairs of grippers 2 are provided on the table 3 that turns intermittently. However, as disclosed in, for example, Japanese Patent Application Laid-Open (Kokai) No. 2002-326604, the grippers can be provided on a chain that revolves along an endless path.

(5) In the structure described above, the guide portions 15c and 16c of the guide members 15 and 16 are moved in an up-and-down direction along arc-shaped paths. However, it is also permissible to make them move in an up-and-down direction perpendicularly near the bag mouth holding position (or while the guide portions 15c and 16c are inside a bag, for example), and, above that, to make them move up and down so as to follow circular arc-shaped paths. It is further possible to move the guide portions 15c and 16c up and down perpendicularly throughout the entire moving process between the bag mouth holding position and the wait position.

(6) In the example described above, the guide members 15 and 16 are designed so as to function as gas blow-in nozzles in addition to function as a guide to hold the bag mouth opened. However, the guide members can be made exclusively for use as a guide, so that gas blow-in nozzles are separately mounted on the guide members.

[0067] Figure 10 shows another type of bag-filling packaging machine according to the present invention.

[0068] The bag-filling packaging machine of Figure 10, compared to the bag-filling packaging machine shown in Figure 1, has no gas replacement nozzle 11 installed at position G. Instead, it has a gas replacement (blow-in) nozzle 75 provided at position E, and the action of the guide members 15 and 16 after the insertion of the gas replacement nozzle 75 into the bag 1 is slightly different; however, other respects, including the overall structure and action, is the same as those of Figure 1.

[0069] In the bag-filling packaging machine of Figure 10, at position E, the gas replacement nozzle 75 descends toward the bag mouth opened by the guide portions 15c and 16c, and it enters deep inside the bag 1. The gas replacement nozzle 75 is set to be positioned, as shown in Figure 11, on the line 72. This position is a position where, when the guide portions 15c and 16c are closed (shown by imaginary lines), the guide portions 15c and 16c and the gas replacement nozzle 75 are positioned proximally aligned in the bag width direction.

[0070] After being inserted into the bag 1, the gas replacement nozzle 75 immediately effects gas blow-out, and, in conjunction therewith, the guide portions 15c and 16c are closed as shown by the imaginary lines, and the distance between the gripper pair 2 is widened, causing the bag mouth to be tensioned and pulled laterally to the left and right so as to closed. At this point, since the guide portions 15c and 16c and the gas replacement nozzle 75 are positioned proximally and aligned in the bag width direction, the opening of the bag mouth is very narrow. When gas replacement is performed in this condition, the inflow of outside air into the bag interior and the outflow of gas from the bag interior are limited, so that high level gas replacement efficiency is assured.

[0071] Though in Figure 11 the guide portions 15c and 16c and gas replacement nozzle 75 are circular in shape, they can be a flat shape in the bag width direction, and this design bring a further improved gas replacement efficiency with the opening of the bag mouth being made further smaller.

[0072] Gas blow-out from the guide portions 15c and 16c is performed continuously until the bag is moved to position G. At position G, the guide members 15 and 16 ascend to the wait position, the guide portions 15c and 16c are extracted from the bag 1, and gas blow-out stops. At the same time, the distance between the grippers 2 is further widened so that the bag mouth is tensioned to the left and right, thus closing the bag mouth of the bag 1.

[0073] In the bag-filling packaging machines shown in Figures 1 and 10, both of the guide members 15 and 16 are connected to the gas supply source. However, gas replacement efficiency can be improved and gas consumption can be reduced by implementing various connection modes and communicating/cutting-off action modes with a gas supply source and a vacuum source. For instance, one of the guide members 15 and 16 can be connected to a vacuum source for removing the gas from inside the bag, or one or both of the guide members 15 and 16 can be connected in a switchable fashion to the gas supply source and the vacuum source, or both guide members 15 and 16 can be connected to the gas supply source in a gas blow-in pressure adjustable manner. Thus, the openings at the tip ends of the guide por-

tions 15c and 16c of the guide members 15 and 16 make gas passage openings so that gas passes through the openings so as to be blown into the bag and to be taken out of the bag. The openings can be provided, in addition to and/or instead of the tip ends of the guide portions 15c and 16c, at other suitable places such as side walls of the guide portions 15c and 16c. What kind of connection mode or action mode is preferable can be deduced from experience, according to the various contents to be packaged and the bag size.

[0074] Figure 12 shows a connecting configuration in which two gas (nitrogen gas) supply sources 76 and 77 are connected through switchover valves 78 and 79 to the guide members 15 and 16, so that the switchover valves 78 and 79 are controlled by a controller 81. In this case, for weak blow-in, for example, the switchover valve 78 is activated and only the gas supply source 76 is made communicating; however, when strong blow-in is to be conducted, the switchover valve 79 is also activated causing both of the gas supply sources 76 and 77 to be communicating. In general, gas replacement efficiency is enhanced by conducting weak blow-in while the bag mouth of the bag 1 is open and conducting strong blow-in when the bag mouth is tensioned to the left and right and the bag mouth is closed.

[0075] In Figure 13, the guide member 15 is connected through a switchover valve 83 to an inactive gas supply source 81, the other guide member 16 is connected through a switchover valve 84 to a vacuum source (vacuum pump) 82, and the switchover valves 83 and 84 are controlled by a controller 85. In this configuration, the switchover valve 83 is activated and gas blow-in is conducted while the bag mouth of the bag 1 is open; and when the bag mouth is tensioned to the left and right and the bag mouth is closed, then the switchover valve 83 and the switchover valve 84 are alternately or simultaneously activated, so that gas blow-in and gas removal are conducted alternately or simultaneously.

[0076] In the structure of Figure 14, an inactive gas supply source 86 and a vacuum source (vacuum pump) 87 wherein a gas composition analysis indicator is installed are connected to the guide members 15 and 16 so that switchover can be made by switchover valves 88 and 89 by a controller 91. After blowing the inactive gas from the gas supply source 86 into the bag 1 thus effecting gas replacement for the inside of the bag 1, gas is sucked out from the interior of the bag by the vacuum source 87, and the composition of the gas inside the bag is analyzed by the gas composition analysis indicator.

[0077] In the configuration of Figure 14, while the bag mouth of the bag 1 is open, the switchover valve 88 is activated, the switchover valve 89 is switched to the gas supply source 86 side, and gas blow-in is conducted; and further, the bag mouth is tensioned to the left and right so as to be closed (by moving the grippers 2 in the opposite directions), and then, after a prescribed time has elapsed, gas blow-in is stopped by the switchover valve 88, the switchover valve 89 is switched over to the vacuum source 87 side, the gas inside the bag is removed (sucked out), and the gas composition is analyzed; and then the switchover valve 89 is again switched over, gas removal is stopped, and the guide portions 15c and 16c are extracted from the bag 1. In this case, the gas replacement rate can be tested for in-line; and, when a defective bag in which the gas replacement rate is poor is detected, control is effected by the controller 89 so that, in, for instance, the bag-filling packaging machine shown in Figure 10, the defective product is not discharged at position I but is discharged at position J.

Claims

1. A bag-filling packaging machine, comprising a plurality of pairs of grippers for respectively gripping edges of both sides of each of supplied bags and suspendingly holding the bag, said plurality of pairs of grippers being disposed at equal intervals along a horizontal endless bag conveyance path and revolvingly moved in one direction, said bag-filling packaging machine successively performing on bags held by said pairs of grippers various packaging operations including opening bag mouths, filling bags with contents to be packaged, and sealing the bag mouths,
said bag-filling packaging machine further comprising pairs of guide members that are, respectively, correspondingly provided to said pairs of grippers, are revolvingly moved together with said pairs of grippers and are moved with a predetermined timing between an wait position and a bag mouth holding position;
each of said pairs of guide members having guide portions at tip ends thereof, said guide portions being positioned outside bag mouths when in the wait position and being inserted into the bags through opened bag mouths when in the bag mouth holding position, said guide portions mutually opening and closing with a predetermined timing so that when opened said guide portions hold the bag mouth in a prescribed open shape; and
said guide members being provided inside thereof with gas flow passageways and provided with gas passage openings in said guide portions.

2. The bag-filling packaging machine according to claim 1, wherein, when said guide portions of each pair of guide members are in a closed condition inside a bag, said guide portions are positioned proximally to each other, aligned in a bag width direction, at a position substantially in a center of the bag width direction.

3. The bag-filling packaging machine according to claim 2, wherein said guide portions of each pair of guide members, when opening and closing inside a

bag, are mutually moved in opposite directions along respectively circular arc-shaped paths in a horizontal plane, said circular arc-shaped paths being both provided so as to approach, in middle portions thereof, a center of the bag width direction.

4. The bag-filling packaging machine according to any one of claims 1 to 3, wherein, in each pair of guide members,
one guide member is connected to one of:

a gas supply source such that gas supply can be made or stopped, and
a gas supply source and a vacuum source interchangeably such that gas supply and vacuum can be made or stopped; and

another guide member is connected to one of:

a gas supply source such that gas supply can be made or stopped,
a gas supply source and a vacuum source interchangeably such that gas supply and vacuum can be made or stopped, and
a vacuum source such that vacuum can be made or stopped.

5. The bag-filling packaging machine according to claim 4; wherein said vacuum source is provided with a gas composition analysis indicator.

6. The bag-filling packaging machine according to claim 4 or 5, wherein said guide member that is connected to said gas supply source is adjustable for a gas blow-in pressure thereof.

7. The bag-filling packaging machine according to any one of claims 1 to 6, wherein said pairs of grippers are provided at equal intervals at a periphery of a table that turns continuously or intermittently in one direction in a horizontal plane.

8. The bag-filling packaging machine according to any one of claims 1 to 7, wherein
said bag-filling packaging machine further comprises filling hoppers that are provided respectively corresponding to said pairs of grippers, said filling hoppers being revolvingly moved together with said pairs of grippers and capable of moving between a wait position and an insertion position, and
said filling hoppers are, while revolvingly moved together with said pairs of grippers, moved between the wait position and said insertion position with a predetermined timing, so that said filling hoppers are positioned outside the bag mouths in the wait position and are inserted into the bags through opened bag mouths in the insertion position.

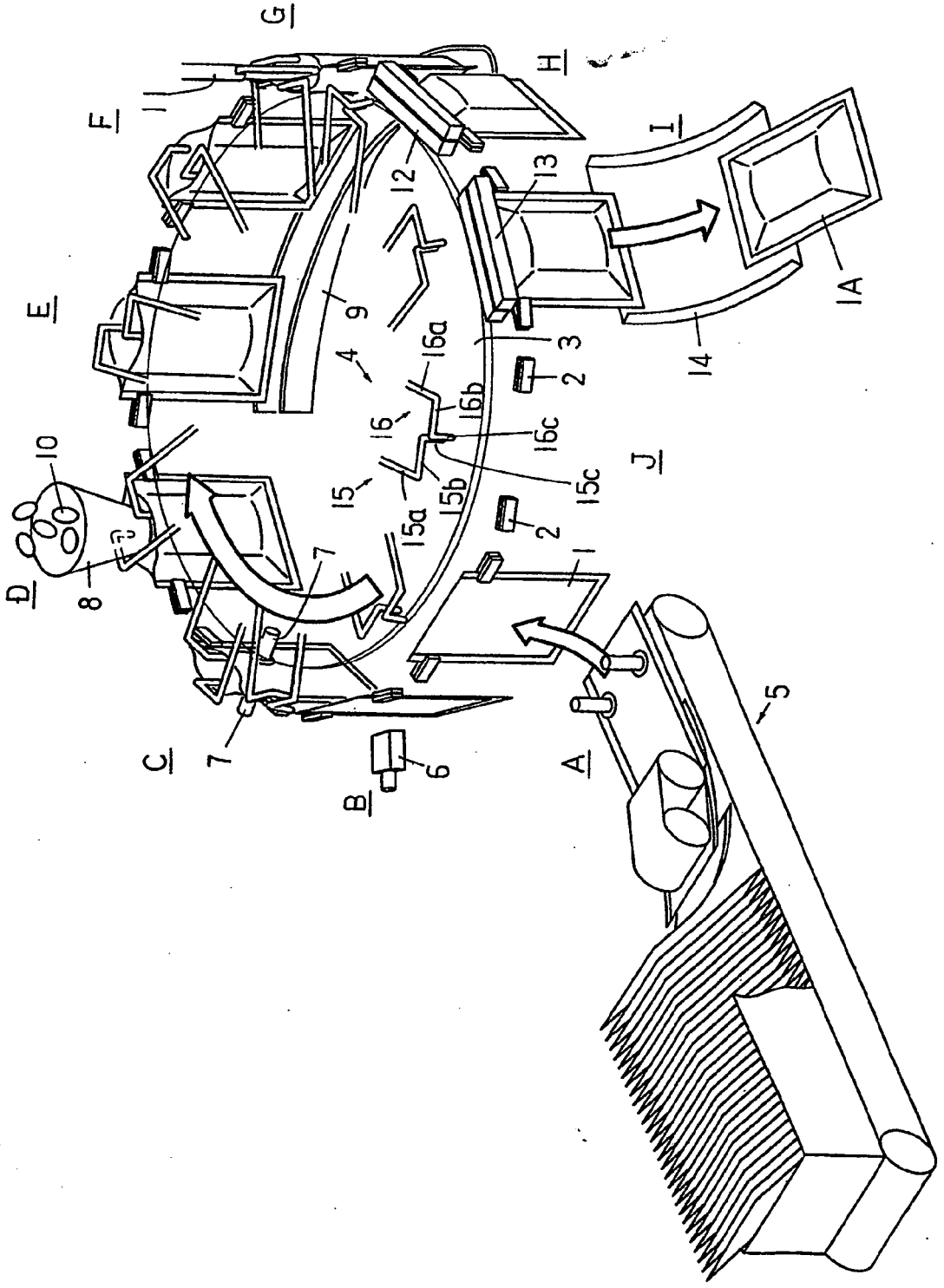
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FIG. 1

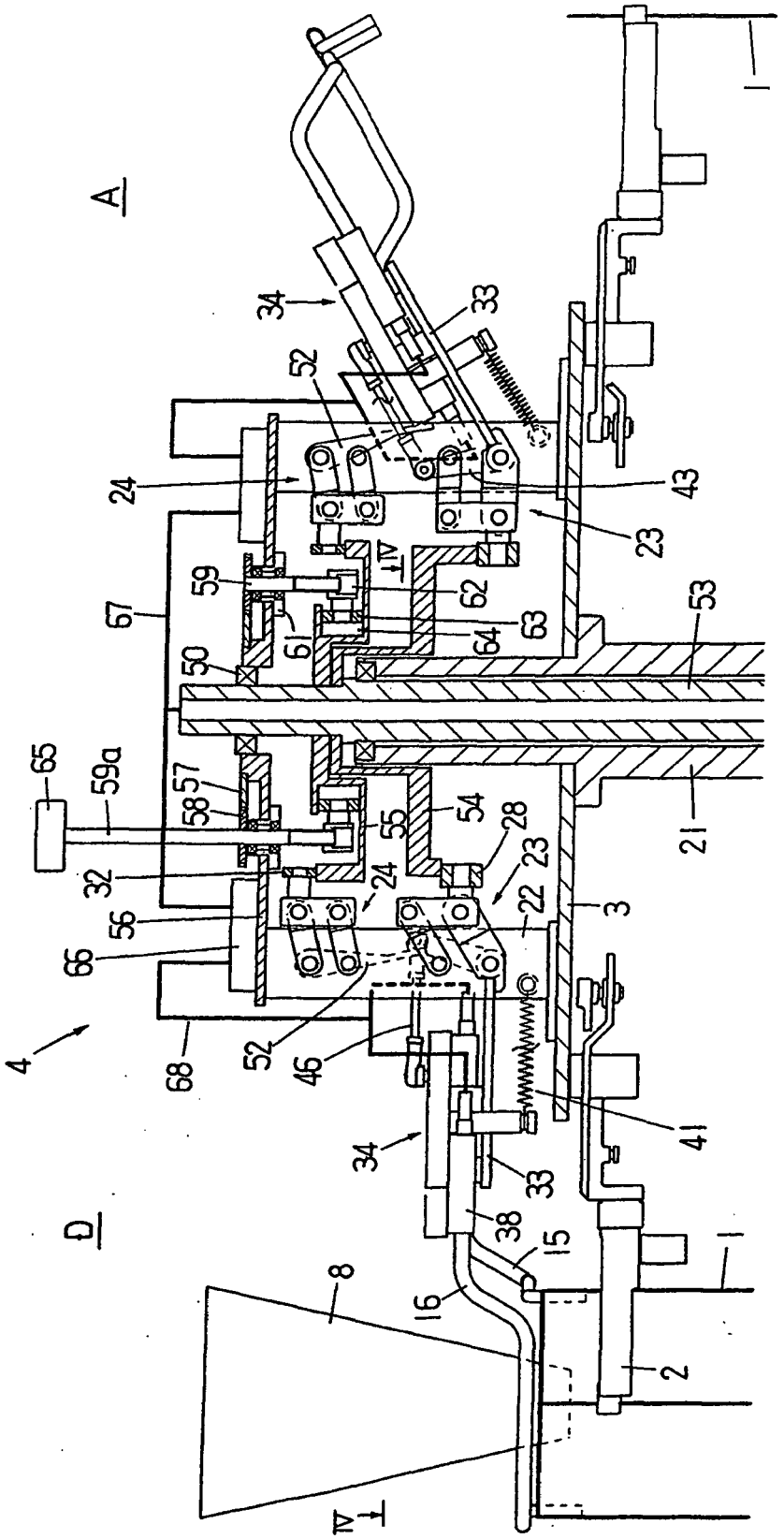
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FIG. 2

FIG. 3

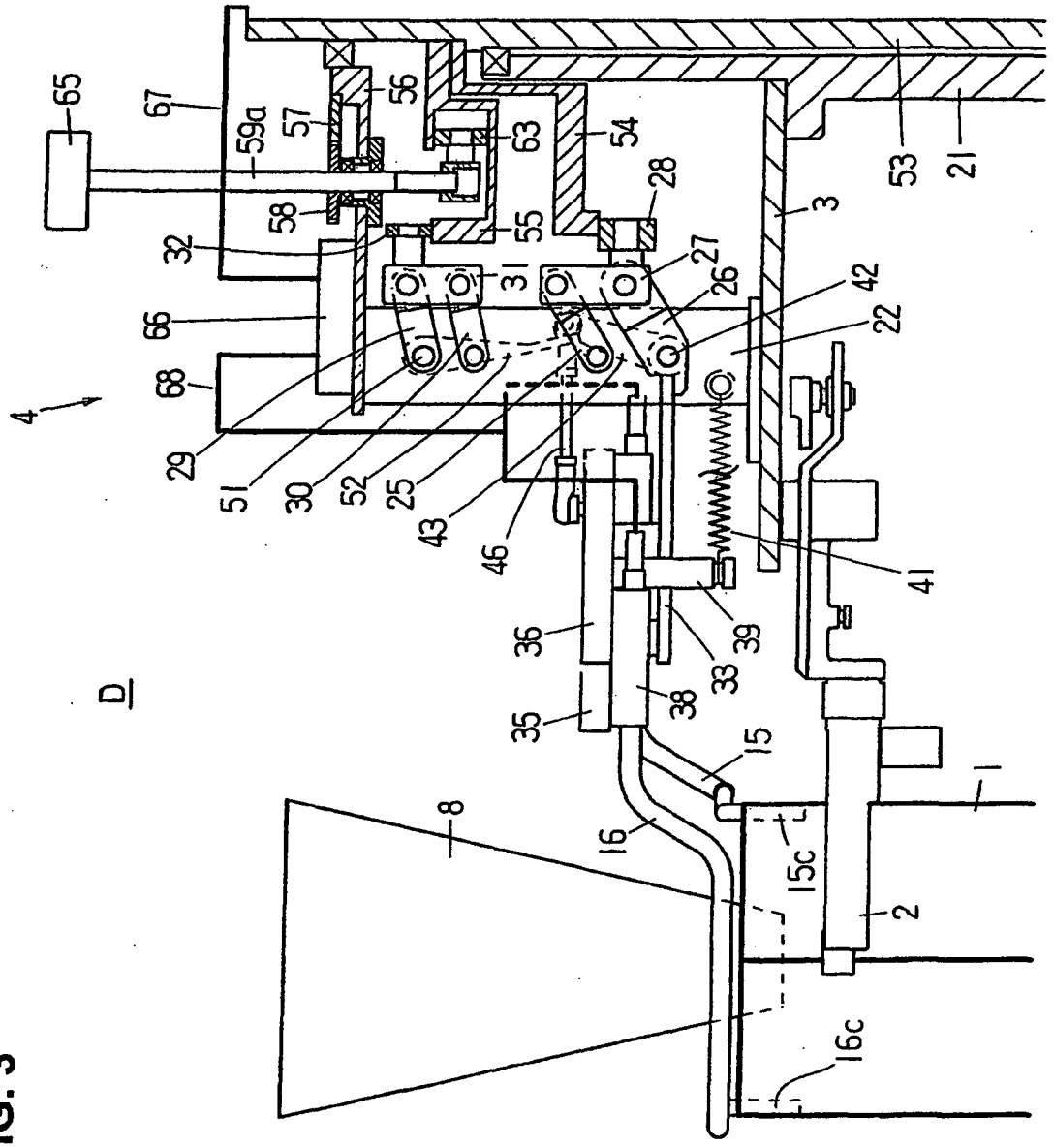
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FIG. 4

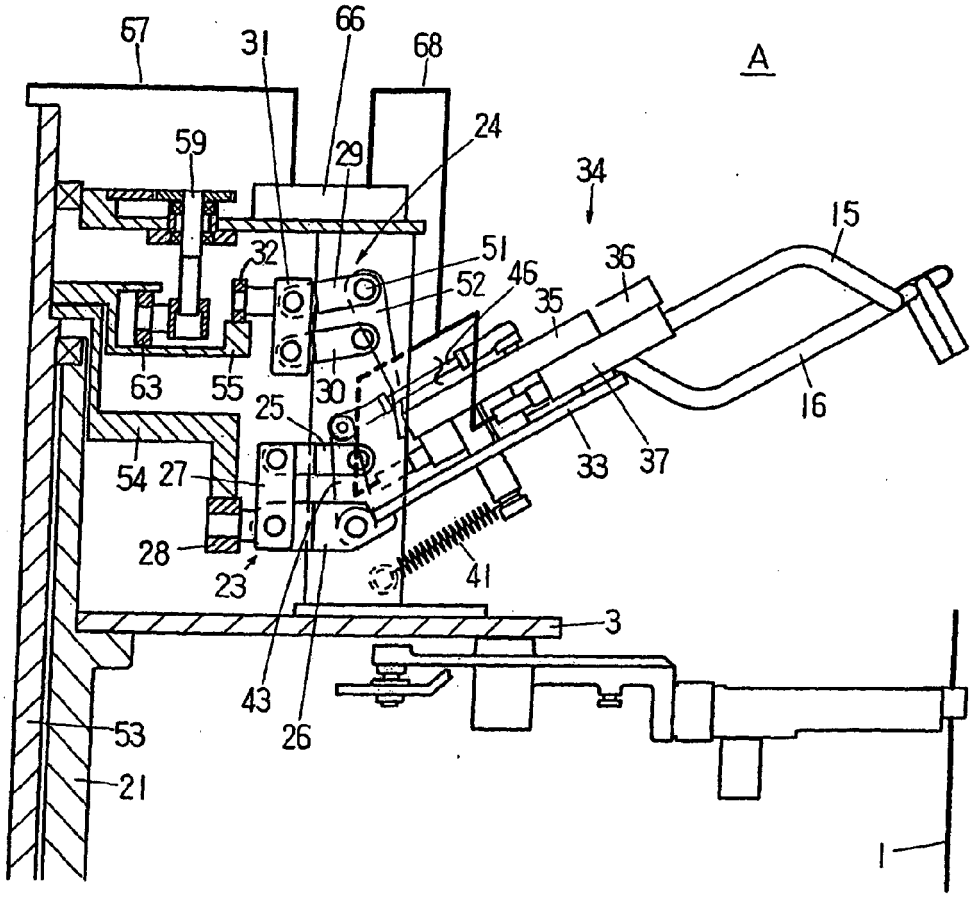
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FIG. 5

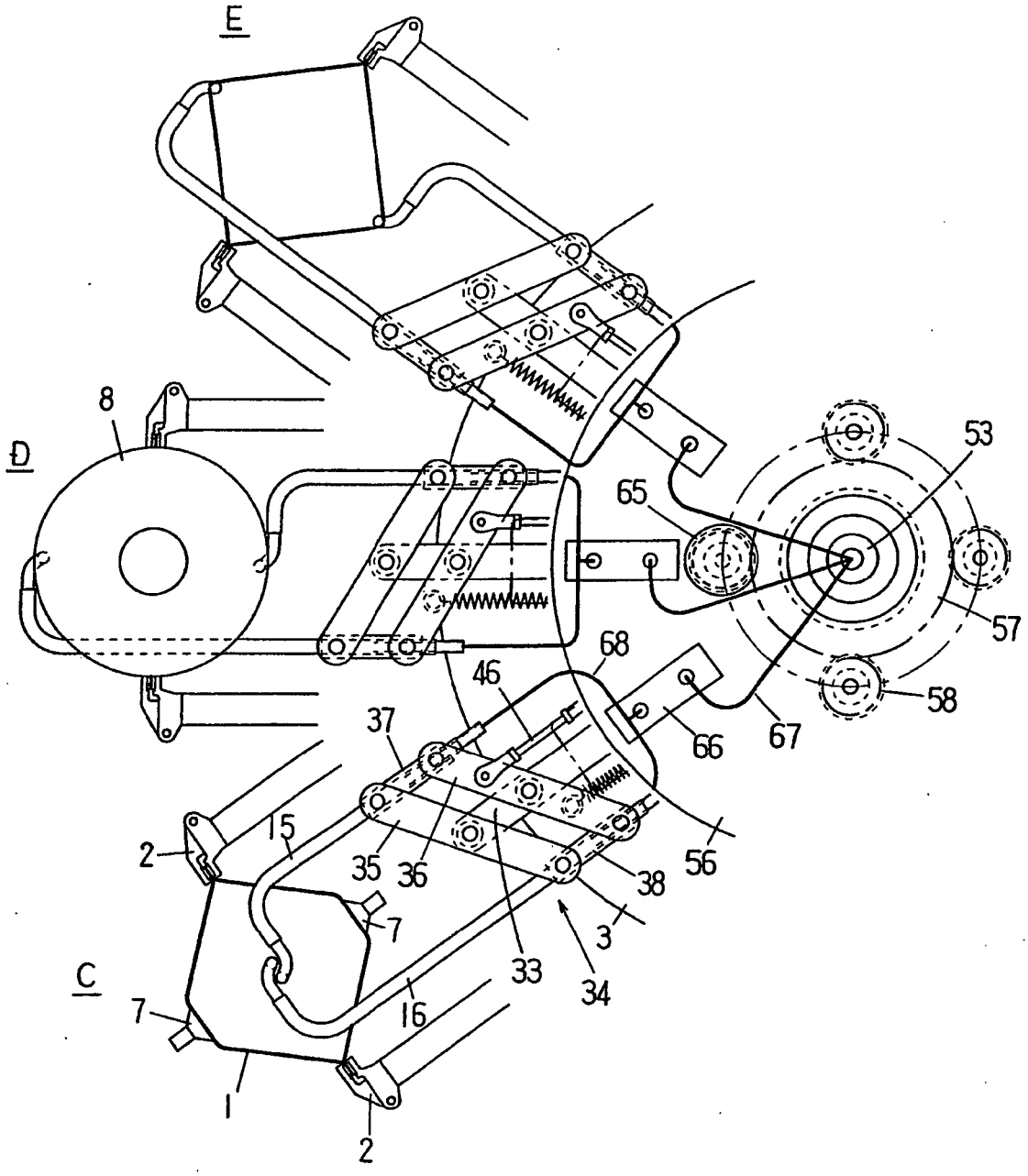
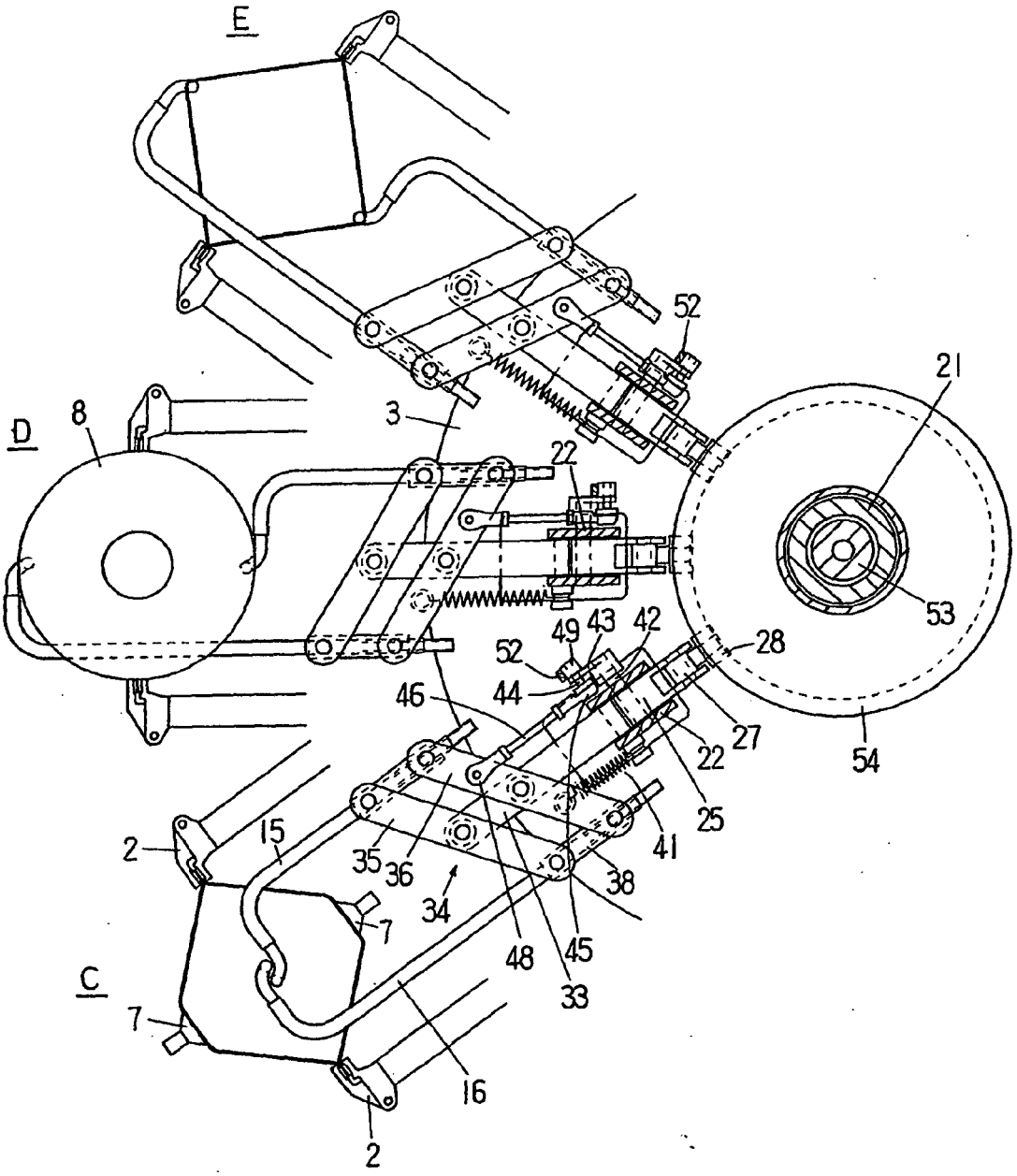


FIG. 6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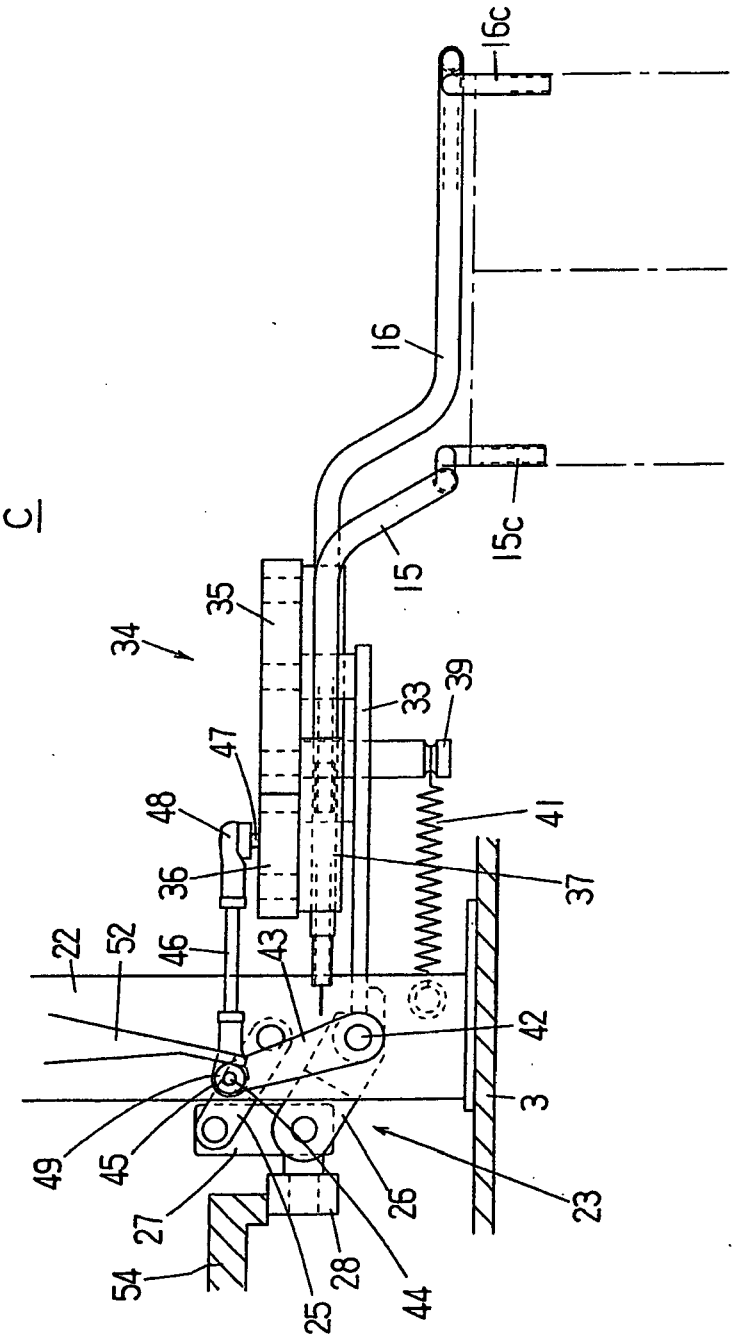
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FIG. 7

FIG. 8

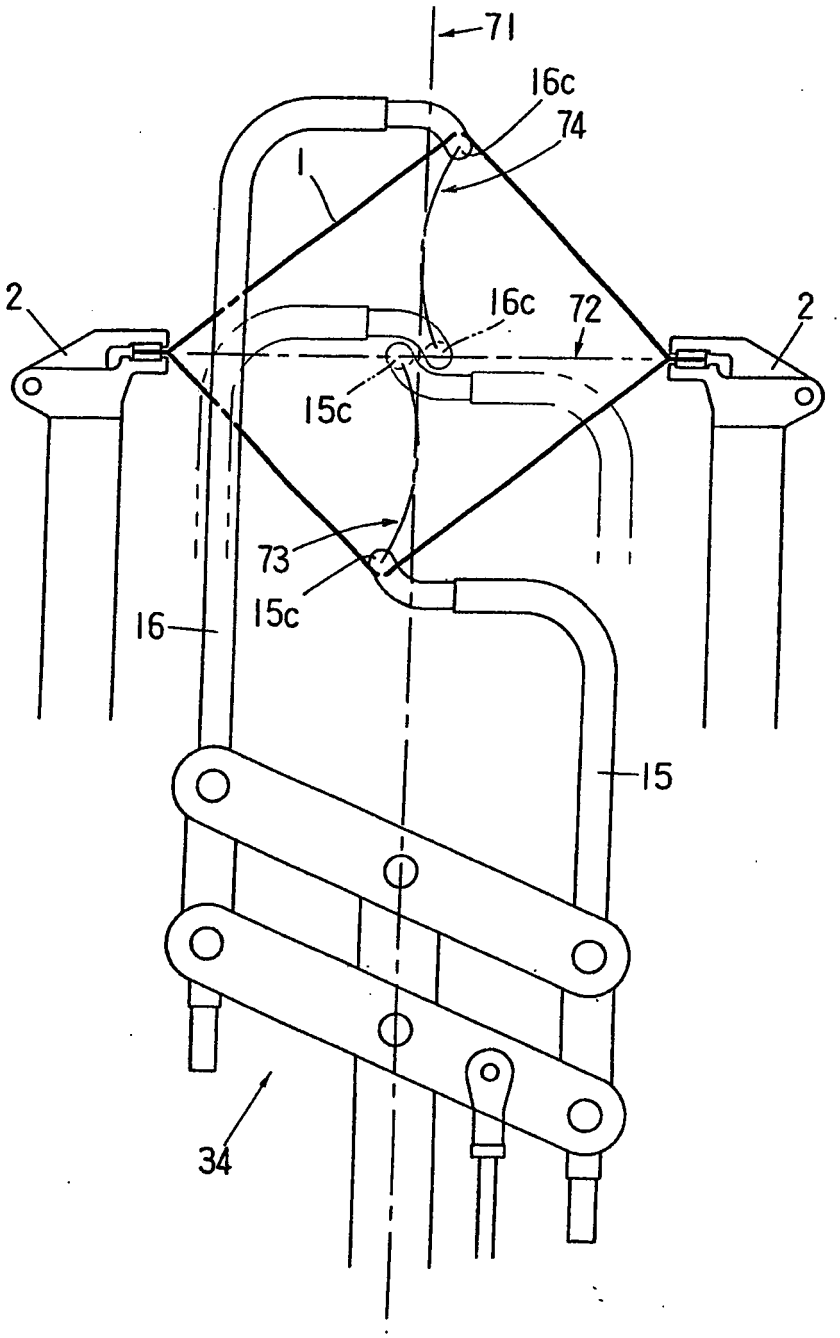
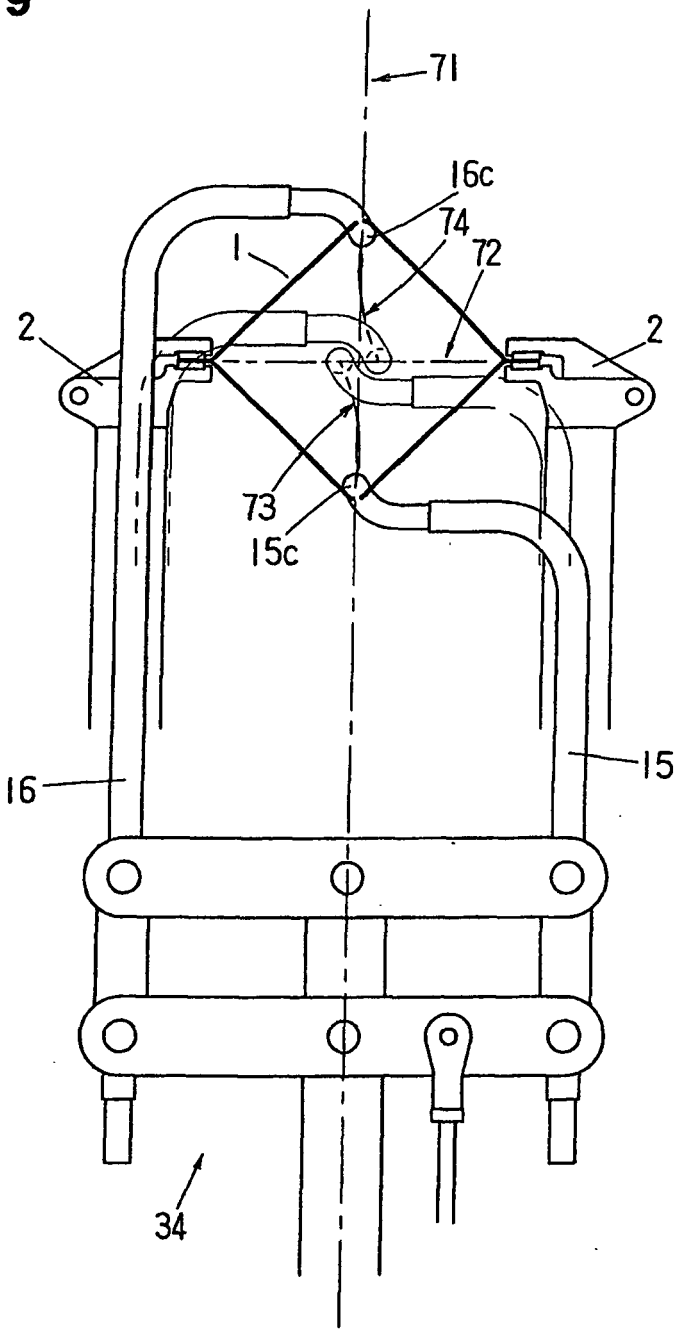


FIG. 9



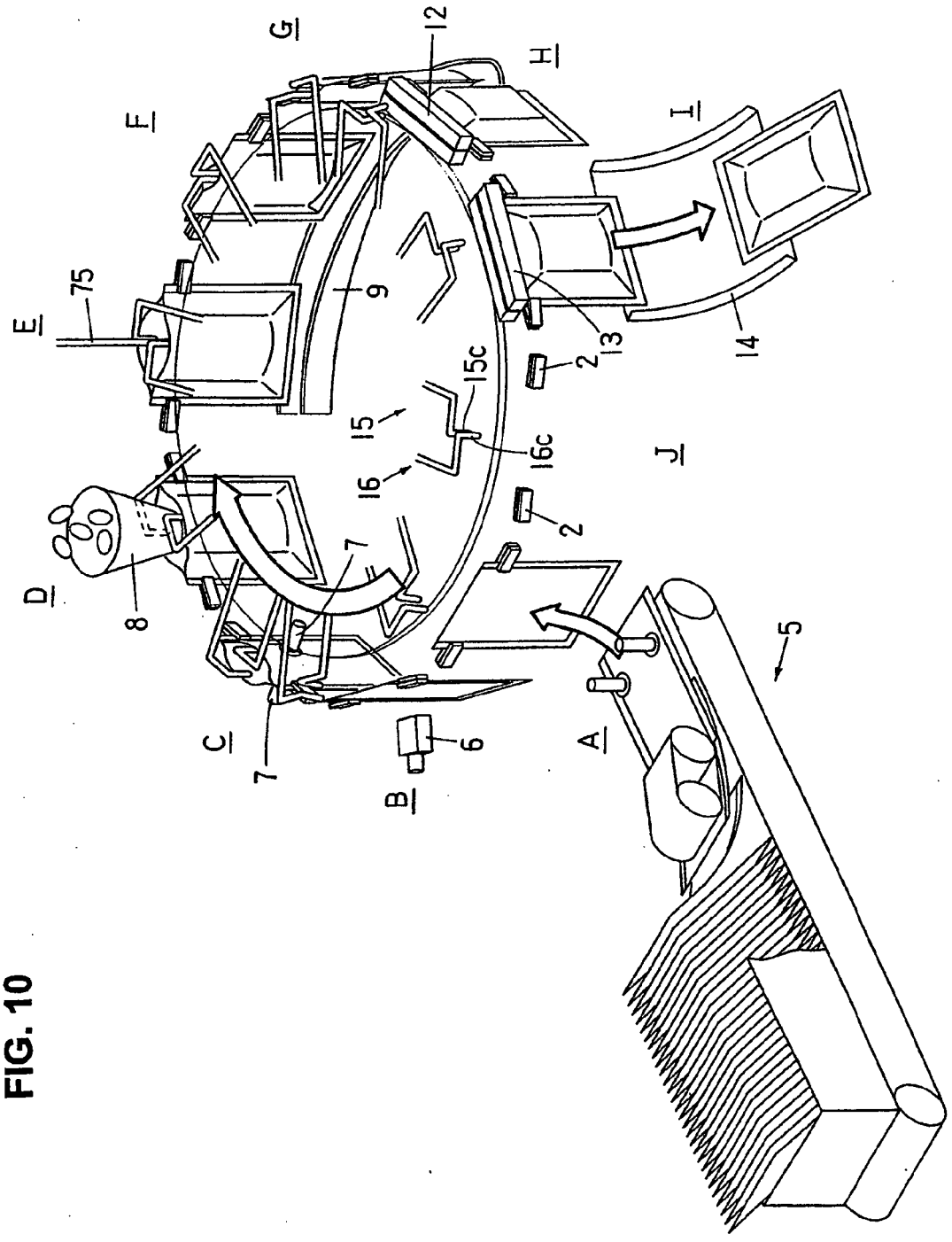
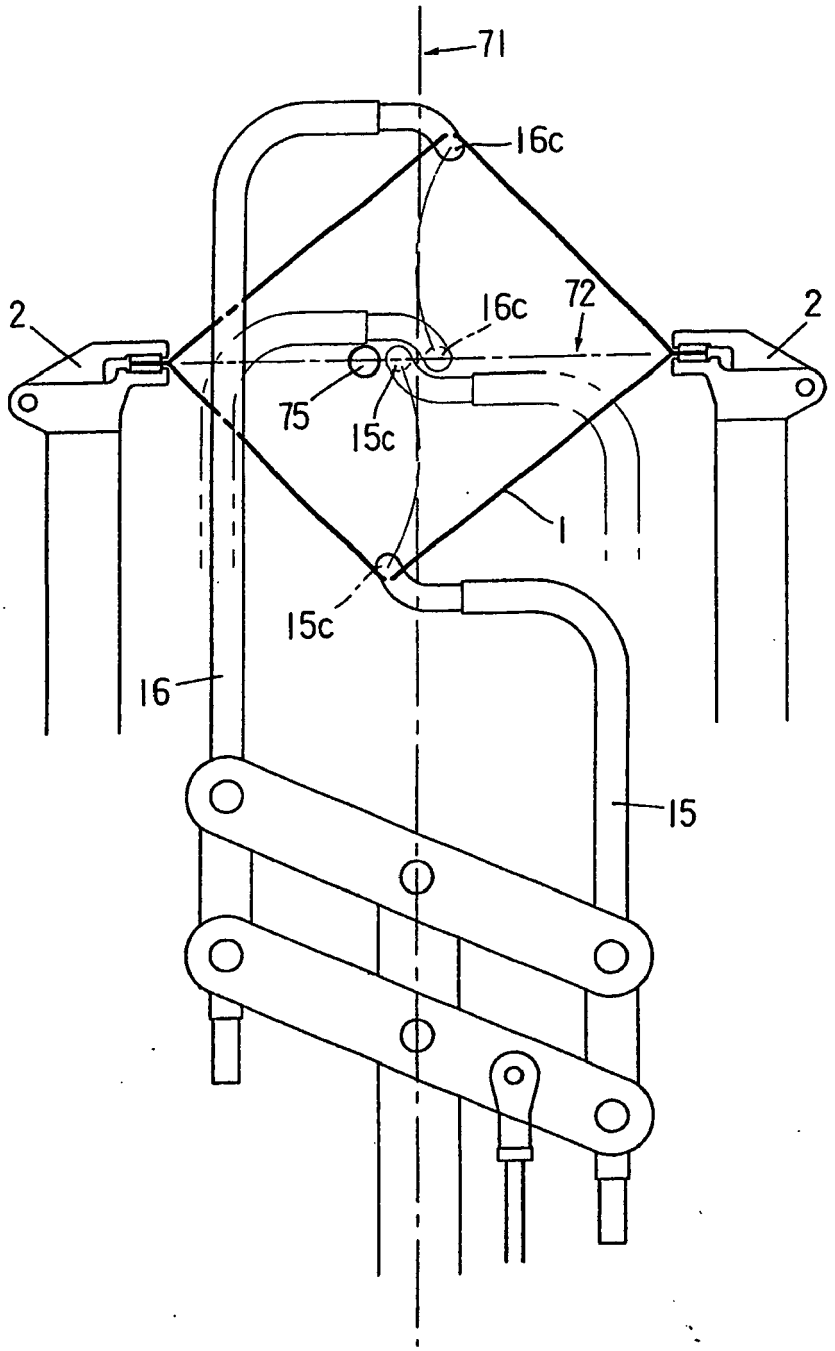


FIG. 10

FIG. 11



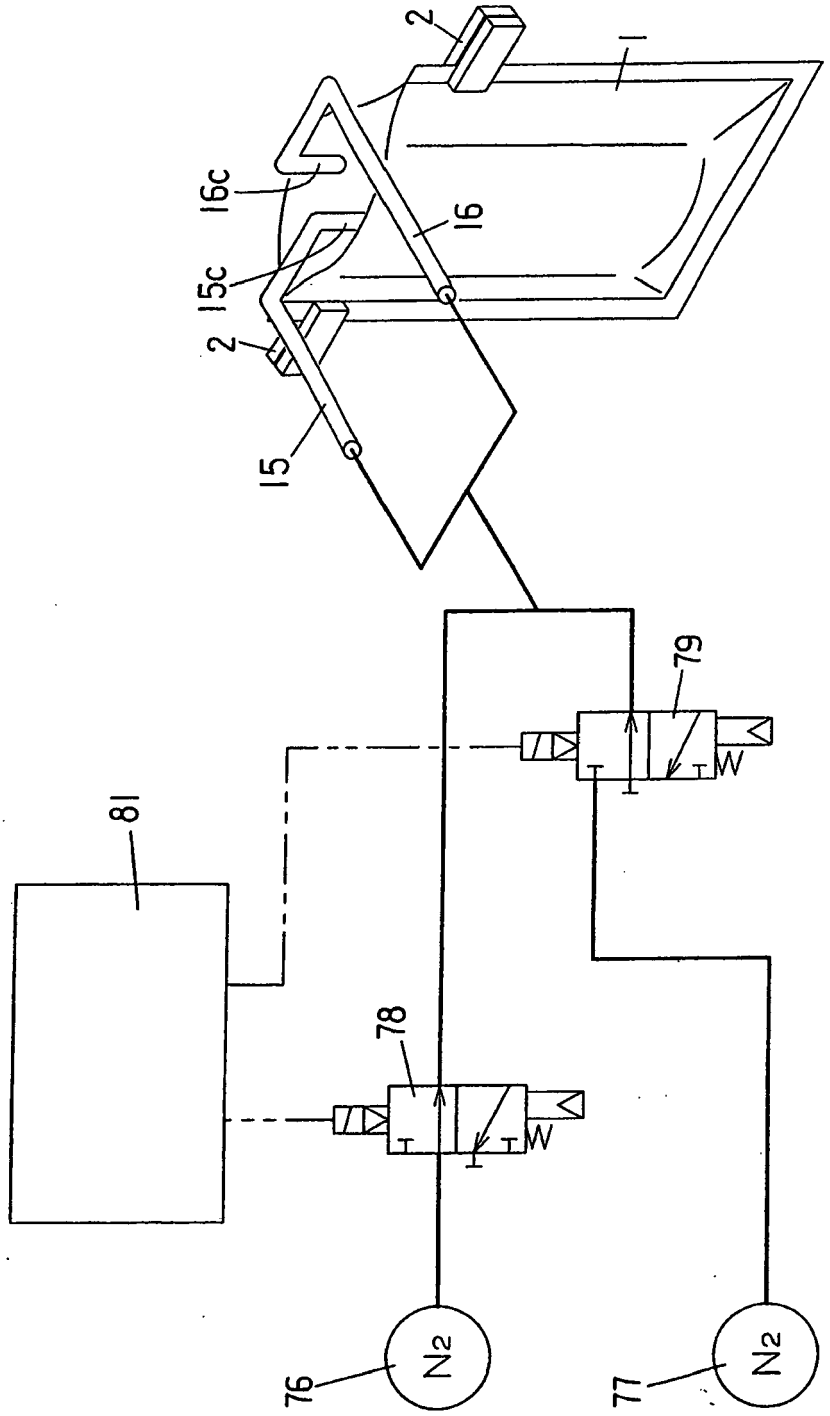


FIG. 12

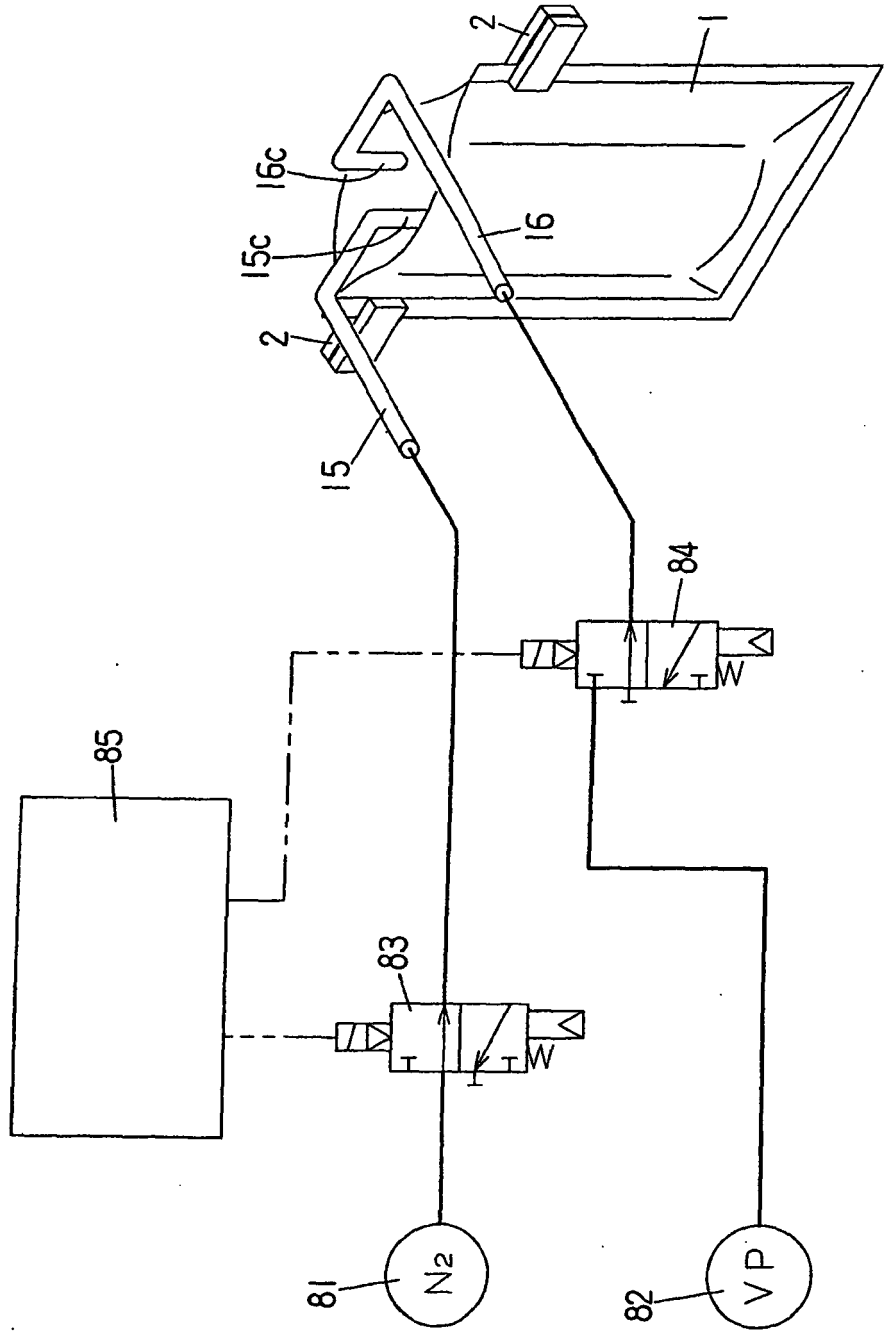


FIG. 13

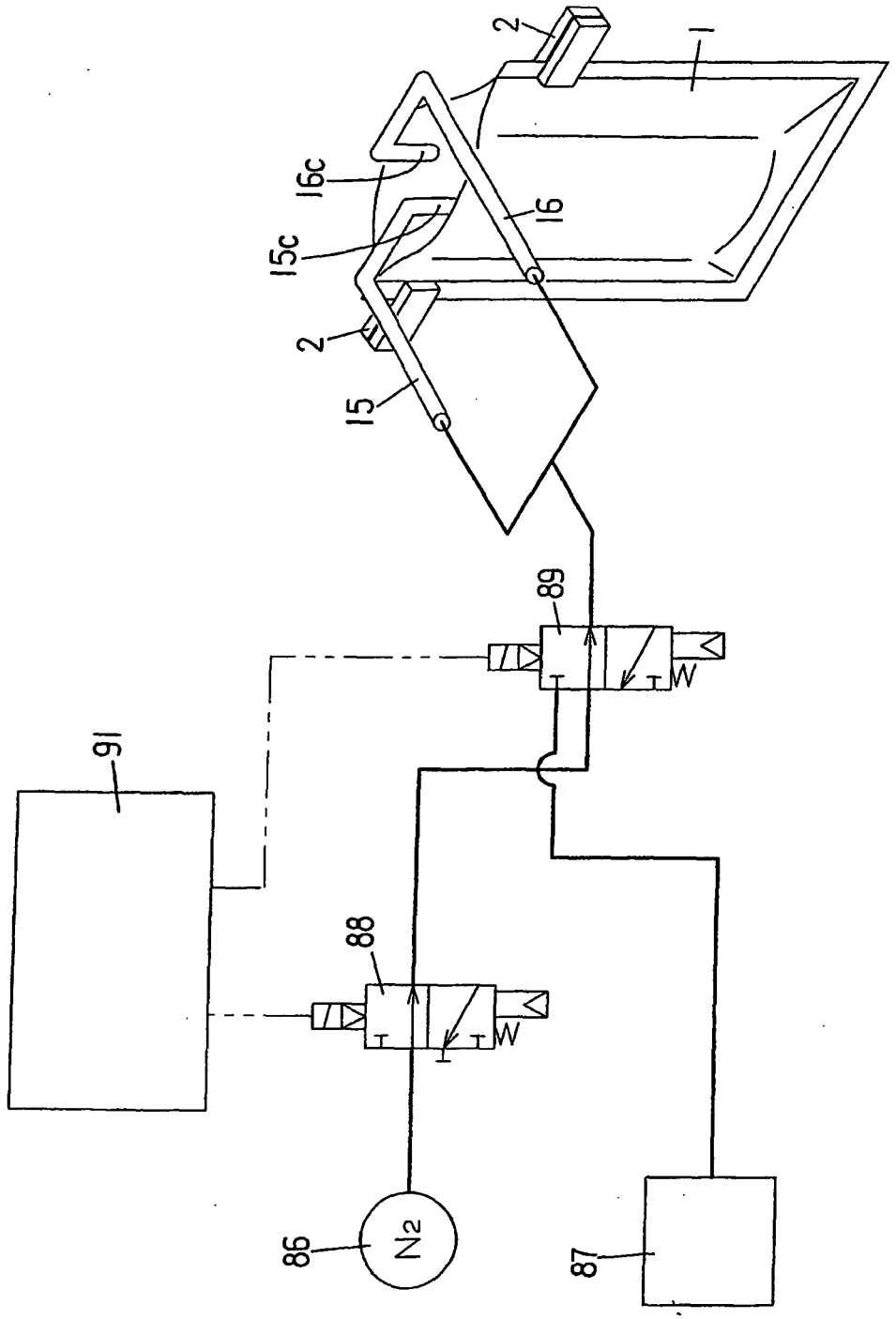


FIG. 14

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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
The Hague	18 January 2007	Jagusiak, Antony

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