Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 2826314 C 2019/07/30

(11)(21) 2 826 314

(12) BREVET CANADIEN
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 2013/09/06

(41) Mise à la disp. pub./Open to Public Insp.: 2014/11/10

(45) Date de délivrance/Issue Date: 2019/07/30

(30) Priorité/Priority: 2013/05/10 (JP P2013-099993)

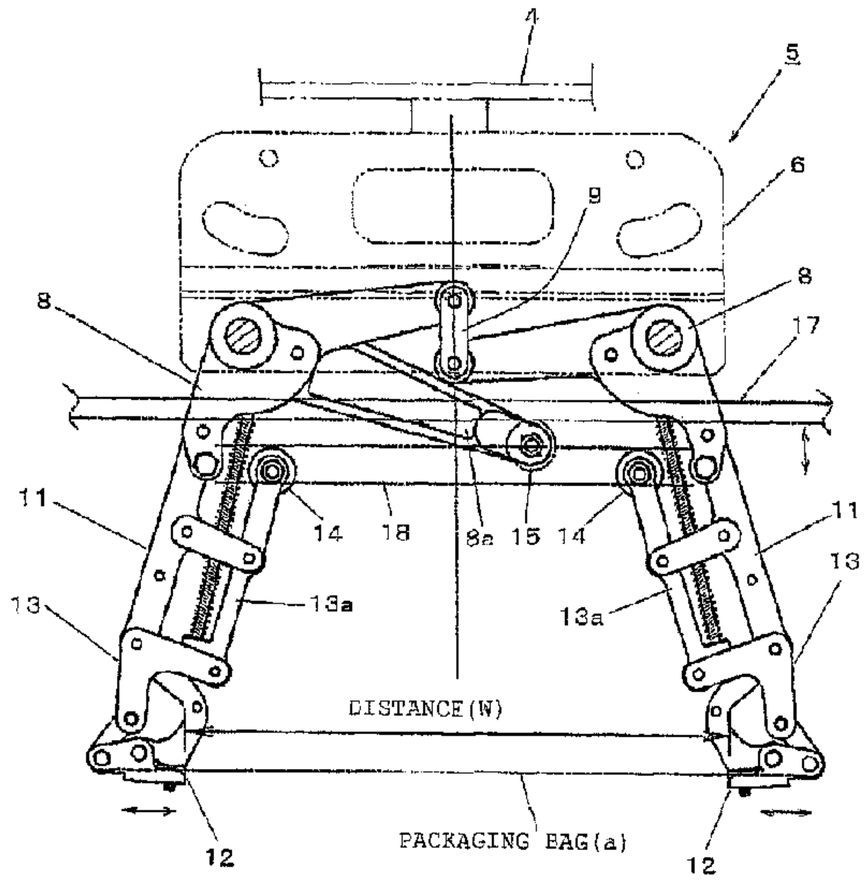
(51) Cl.Int./Int.Cl. *B65B 31/02* (2006.01)

(72) Inventeur/Inventor:
TAKAHASHI, MASAAKI, JP

(73) Propriétaire/Owner:
GENERAL PACKER CO., LTD., JP

(74) Agent: OSLER, HOSKIN & HARCOURT LLP

(54) Titre : METHODE D'EMBALLAGE A REMPLISSAGE DE GAZ ET MACHINE D'EMBALLAGE CORRESPONDANTE
(54) Title: GAS-FILLING PACKAGING METHOD AND PACKAGING MACHINE THEREFOR



(57) Abrégé/Abstract:
A gas-filling packaging method using a track type gas-filling packaging machine includes a bag placing step in which a number of packaging bags set in a magazine in a stacked state are turned up one by one by a sucker and picking up and then passing the bag to a bag chuck, a bag opening/inflating step of opening the bag mouth and inflating the bottom of the bag by suckers, a bag filling step of lowering a synchronous funnel to be inserted into the bag and applying a receiving member of a bottom tapping unit to the bag, so that the bag is filled with a predetermined amount of article while the bottom is tapped, a deaeration/temporarily sealing step of inserting a deaeration nozzle into the bag to remove air in the bag and holding the bag mouth by a temporary heater so that a temporary seal is applied to the bag mouth, a bag mouth sealing step of heat-sealing the temporarily sealed part, and a seal cooling/bag removing step of cooling the heat-sealed part and removing the bag outside the system.

ABSTRACT

A gas-filling packaging method using a track type gas-filling packaging machine includes a bag placing step in which a number of packaging bags set in a magazine in a stacked state are turned up one by one by a sucker and picking up and then passing the bag to a bag chuck, a bag opening/inflating step of opening the bag mouth and inflating the bottom of the bag by suckers, a bag filling step of lowering a synchronous funnel to be inserted into the bag and applying a receiving member of a bottom tapping unit to the bag, so that the bag is filled with a predetermined amount of article while the bottom is tapped, a deaeration/temporarily sealing step of inserting a deaeration nozzle into the bag to remove air in the bag and holding the bag mouth by a temporary heater so that a temporary seal is applied to the bag mouth, a bag mouth sealing step of heat-sealing the temporarily sealed part, and a seal cooling/bag removing step of cooling the heat-sealed part and removing the bag outside the system.

GAS-FILLING PACKAGING METHOD AND PACKAGING MACHINE THEREFOR

BACKGROUND

1. Technical Field

The present disclosure relates to a gas-filling packaging method in which a large-sized packaging bag is filled with an article such as about 10 to 20 kilograms of rice, sugar, pet food or fertilizer and is also filled with an inert gas and then sealed, and a packaging machine carrying out the method.

2. Related Art

There has conventionally been known a method of packaging by filling a packaging bag with an article such as about 1 to 15 kilograms of rice or sugar. For example, Japanese patent application publication No. JP-A-2010-126244 filed by the applicant of the present application discloses a packaging method in which a rotary type gas-filling packaging machine is used. In this method, a packaging bag is filled with 10 to 15 kilograms of rice. The packaging bag heavily loaded with rice is then pressed from front and rear sides thereof by a pressing member provided with a vibrator and further stretched in the up-down direction, thereby being shaped so as to have a predetermined thickness. Simultaneously, air in the bag is

eliminated by a deaeration nozzle and a mouth of the bag is heat-sealed.

However, the above-described rotary type packaging machine is constructed so that grips supporting packaging bags are rotated while being radially disposed on a rotating member. A large centrifugal force is developed when a packaging bag filled with 10 to 15 kilogram article is moved among stations while being rotated. This results in a disadvantage that grips leaves an imprint of holding portions on the bag. Furthermore, since the conventional shaping work is carried out only at one station, it is difficult to maintain stability in the form of the bag after the shaping. This constitutes a cause for easiness to collapse in the case where products after packaging are laid out flat.

Furthermore, a conventional conveyor type bag placer is constructed so that packaging bags are laid and stacked one upon another on a belt conveyor to be supplied to grips one by one from a front one. A large-sized packaging bag having a length ranging from 600 to 1050 mm increases the length of the belt conveyor, resulting in requirement of a large space. Furthermore, when zippered bags are fed forward on the belt conveyor, slightly bulging chucks or zippers block smooth movement of the bags. Still furthermore, a conventional magazine type bag placer is constructed so that a guide which accommodates a packaging bag when a bag size is switched is manually adjusted, as disclosed by Japanese patent application publication No. JP-A-2008-285171. The disclosed magazine type packaging machine does not have a function suitable for total automation of the packaging machine. The disclosed magazine

type packaging machine is further unsuitable for stock of large-sized gazette bags and large-sized zippered bags and a bag placing work.

Furthermore, grips of the conventional packaging machines are structured so that a holding portion supporting a packaging bag is manually adjusted according to a width of the bag. This results in a problem that switching with change in the bag size requires much time and labor.

SUMMARY

Therefore, an object of the present disclosure is to provide a gas-filling packaging method which can pack an article into a large-sized packing bag in the form of good quality and stability and can achieve automation of the whole work including switching of related apparatus with change in bag size, and a gas-filling packaging machine therefor.

The present disclosure provides a gas-filling packaging method using a track type gas-filling packaging machine in which a number of grip units each horizontally moved along an annular passage including two linear sections and semicircular sections located at opposite ends of the linear sections, the grip units being intermittently moved for every one of a plurality of work steps, and a packaging bag supported by grips of each grip unit in a suspended manner with a bag mouth up is filled with an article and then with a gas, and the bag mouth is heat-sealed, wherein the packaging bag includes a larger-sized gusset bag having two side edges including respective folded portions, a larger-sized standing pouch having a bottom including a folded portion or a

larger-sized zippered bag which is the gusset bag provided with a zipper or the standing pouch provided with a zipper, and a size and a type of the packaging bag and a type of the article are entered on an operation panel, the method comprising a bag feeding step in which a number of packaging bags set in a magazine in a stacked state are turned up one by one from a top by a sucker of a bag replenishing unit thereby to be picked up and then passed to a bag chuck, the sucker being controlled so as to be moved in an up-down direction, and the packaging bag grasped by a bag chuck of a bag supply unit is transferred to an adjacent bag positioning unit to be thrown into a guide of the positioning unit, and the packaging bag is positioned by automatically adjusting a position of a side guide corresponding to a bag width of the guide and positions of a front end guide and a rear end guide at the bag mouth side corresponding to a bag length based on the entered data, and the packaging bag in the guide is gripped by a chuck of the bag supply unit and is held by a cramp of a cramp unit standing by above and having a bag height compensating function to be sent from the cramp to the grips standing by at the bag placing step; a bag opening/inflating step of opening the bag mouth by an adsorption action of suction discs and inflating the bottom of the bag by the adsorption action of the suction discs; a bag filling step of lowering a synchronous funnel which is controlled for up-down movement and horizontal movement in synchronization with transfer of the bag to be inserted into the bag and applying a receiving member of a bottom tapping unit, whereby the bag is filled with a predetermined amount of article while the bottom is tapped so that the article is prompted to

fall, wherein an inert gas is continuously discharged from a gas discharge nozzle provided on the synchronous funnel into the bag, during a period from a last moment of the filling operation to a plurality of subsequent steps; wherein the bag is shaped into a desired shape by a joint work between the bag tapping unit and a shaping unit provided with at least a pair of conveyor units which are controlled so as to hold one or a plurality of packaging bags and so as to be controlled so that a rotational speed synchronizes a transfer speed of the packaging bag, during a period from the bag filling step and to the deaeration/temporally sealing step; wherein the funnel and the gas nozzle are caused to get out of the bag and a part of the bag mouth is kept open by the adsorption action of the suction discs, while the bag is moved to the deaeration/temporarily sealing step, the method further comprising the deaeration/temporarily sealing step of inserting a deaeration nozzle into the bag to remove air remaining in the bag, causing the deaeration nozzle to get out of the bag, holding the bag mouth by a temporary heater so that a temporary seal is applied to the bag mouth; a bag mouth sealing step of heat-sealing the temporarily sealed part; and a seal cooling/bag removing step of cooling the heat-sealed part and subsequently removing the bag outside the system.

According to the above-described gas-filling packaging method, since the article can be packaged into the large-sized bag in a high-quality and stable manner, the method has an advantage that collapse of packaged products is unlikely to occur when the products are laid out flat. Additionally, when the size and type of the bag and the type of article are entered on the

operation panel, all the works can automatically be executed which includes changes in related machines with change in a bag size, for example, changes in a magazine accommodation space of a supplying machine, guide position adjustment in a bag positioning unit, distance adjustment of the holding portions of the grip, whereupon packaging with the use of large-sized bags can smoothly be executed.

In one embodiment, the bag replenishing unit includes a plurality of magazines each of which has an accommodation space automatically adjustable according to a size of the bag, wherein the magazines are circulated from a supply position where the magazines are charged with bags to a replenishing position where the bags are taken out of the magazines by the bag chuck.

Since each magazine has the accommodation space automatically adjustable according to the size of the bag, a troublesome work resulting from the change in the bag size is not required. This can contribute to automatization of the packaging machine.

In another embodiment, the paired right and left holding portions of the grip supporting the bag have a distance therebetween, and the distance is automatically adjusted according to a size of the bag.

Since the grip automatically adjusts the distance between the paired right and left holding portions according to a size of the bag, a troublesome work of adjusting a number of grips one by one with change in the bag size is not required, and handling of the packaging machine can be carried out smoothly and promptly with change in the bag size.

In further another embodiment, when the bag is the zippered gusset bag, after the bag has been supplied, the bag is unzipped and a one-point seal is applied to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, whereby the overlapping portions are fixed together.

When a lower opening of the synchronous funnel is inserted with the bag being open, there is a possibility that the lower opening interferes with the folded portions when the folded portions protrude to an inwardly central part. In view of this, a one-point seal is applied to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, whereby the overlapping portions are fixed together. Consequently, the synchronous funnel can smoothly be inserted.

In further another embodiment, in the bag mouth sealing step, the bag mouth is heat-sealed in a first sealing step and thereafter, the bag mouth is also heat-sealed in a second sealing step.

The bag mouth is heat-sealed in a first sealing step and in a second sealing step, whereby a reliable high quality seal can be applied.

All the steps from the bag feeding step to the seal cooling/bag removing step are arranged at one of the linear sections constituting the annular passage.

All the steps are arranged at one of the linear sections, whereby a time period required for a worker or an administrator to move can be reduced. This can contribute to a reduction in

the work of the worker or the like.

In further another embodiment, when the bag is a paper bag, the paper bag is formed into a shape such that a front and a bag thereof include respective bag mouth portions having different heights, and the paper bag has an inner surface coated with a resin, and in the deaeration/temporarily sealing step, the temporary seal is applied to the bag mouth and thereafter, a part of the bag located above the seal is folded and sewn by a sewing unit installed outside the system.

The disclosure also provides a gas-filling packaging machine which is of a track type in which a number of grip units each horizontally moved along an annular passage including two linear sections and semicircular sections located at opposite ends of the linear sections, the grip units being intermittently moved for every one of a plurality of work stages, and a packaging bag supported by grips of each grip unit in a suspended manner with a bag mouth up is filled with an article and then with a gas, and the bag mouth is heat-sealed, wherein the packaging bag includes a larger-sized gusset bag having two side edges including respective folded portions, a larger-sized standing pouch having a bottom including a folded portion or a larger-sized zippered bag which is the gusset bag provided with a zipper or the standing pouch provided with a zipper, the machine comprising an operation panel on which a size and a type of the packaging bag and a type of the article are entered; a bag replenishing unit which turns up a number of packaging bags set in a magazine in a stacked state, one by one from a top by a sucker movable in an up-down direction, picks up and then passes the bags to

a horizontally movable bag chuck, and transfers the bag grasped by the bag chuck to an adjacent bag positioning unit to throw the bag into a guide of the positioning unit; the bag positioning unit automatically adjusting a position of a side guide corresponding to a bag width of the guide and positions of a front end guide and a rear end guide at the bag mouth side corresponding to a bag length based on the entered data; a bag feeding unit which grips the bag in the guide by the chuck of a bag supply unit, causes a cramp of a cramp unit standing by above and having a bag height compensating function to hold the bag with the bag mouth up to send the bag to the grip standing by at a bag feeding step; an opening unit which opens the bag mouth by an adsorption action of first suckers provided at both sides of the bag so that suckers are movable forward and backward; a preshaping unit which inflates a bottom of the bag by an adsorption action of second suckers provided below both sides of the bag; a filling unit which fills the bag with a predetermined amount of an article by a synchronous funnel which is controlled to be moved upward and downward and horizontally in synchronization with transfer of the bag, the filling unit also brings an inert gas into the bag by a gas nozzle provided on the funnel during a period from a last moment of the filling operation to a plurality of subsequent steps; a shaping unit which shapes the bag into a desirable shape by a joint work between the bag tapping unit and at least a pair of conveyor units during a period from the bag filling step and to the deaeration/temporally sealing step, said bag tapping unit including a receiving member applied to the bottom of the bag and tapped so that the article is prompted to fall, said conveyor

units being controlled so as to hold one or a plurality of bags and so that a rotating speed synchronizes with a transfer speed of the bag; a movable bag mouth auxiliary opening unit which opens part of the bag mouth by the adsorption action of the suckers which are provided at both sides of the bag mouth so as to be movable forward and backward, so that a deaeration nozzle is insertable, the auxiliary opening unit being capable of closing the part of the bag other than the open part; a temporarily sealing unit which holds the bag mouth by a temporary heater to apply a temporary seal to the bag mouth; a main sealing unit which applies heat seal to the temporarily sealed part of the bag; and a cooling unit which cools the heat-sealed part of the bag.

According to the above-described gas-filling packaging method, since the article can be packaged into the large-sized bag in a high-quality and stable manner, the method has an advantage that collapse of packaged products is unlikely to occur when the products are laid out flat. Additionally, when the size and type of the bag and the type of article are entered on the operation panel, all the works can automatically be executed which includes changes in related machines with change in a bag size, for example, changes in a magazine accommodation space of a supplying machine, guide position adjustment in a bag positioning unit, space adjustment of the holding portions of the grip, whereupon packaging with the use of large-sized bags can smoothly be executed.

In one embodiment, the bag resupply unit includes a plurality of magazines each of which has an accommodation space automatically adjustable according to a size of the bag, wherein

the magazines are circulated from a supply position where the magazines are charged with bags to a resupply position where the bags are taken out of the magazines by the bag chuck.

In another embodiment, the magazines are provided with chains which are disposed in parallel to each other in a horizontal direction and are driven by different drive units so as to be capable of normal rotation and reverse rotation; the side guides are attached to the respective chains, and rotating directions of the chains are opposed to each other so that a distance between the side guides is automatically adjusted to a predetermined bag width; and when the chains are rotated in one and the same direction, the side guides are circulated with the predetermined bag width being maintained.

Since each magazine has the accommodation space automatically adjustable according to the size of the bag, a troublesome work resulting from the change in the bag size is not required. This can contribute to automatization of the packaging machine.

In further another embodiment, the paired right and left holding portions of the grip supporting the bag has a distance therebetween, and the distance is automatically adjusted according to a size of the bag.

Since the grip automatically adjusts the distance between the paired right and left holding portions according to a size of the bag, a troublesome work of adjusting a number of grips one by one with change in the bag size is not required, and handling of the packaging machine can be carried out smoothly and promptly with change in the bag size.

In further another embodiment, when the bag is the zippered gusset bag, the chuck is opened at a chuck opening step after bag supply, the machine further comprising a one-point sealing unit which applies a one-point seal to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, thereby fixing the overlapping portions together.

When a lower opening of the synchronous funnel is inserted with the bag being open, there is a possibility that the lower opening interferes with the folded portions when the folded portions protrude to an inwardly central part. In view of this, a point seal is applied to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, whereby the overlapping portions are fixed together. Consequently, the synchronous funnel can smoothly be inserted.

In further another embodiment, the bag mouth sealing unit includes a first sealing unit and a second sealing unit.

The bag mouth is heat-sealed in a first sealing step and in a second sealing step, whereby a reliable high quality seal can be applied.

In further another embodiment, all the steps from the bag feeding step to the seal cooling/bag removing step are arranged at one of the linear sections constituting the annular passage.

All the steps are arranged at one of the linear sections, whereby a time period required for a worker or an administrator to move can be reduced. This can contribute to a reduction in the work of the worker or the like.

BRIEF DESCRIPTIION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a schematic perspective view of a gas-filling packaging machine which executes a method of one embodiment;

FIG. 2 is a plan view of the machine;

FIG. 3 is a side view of the machine;

FIGS. 4A to 4L illustrate a schematic diagram to explain contents of work in a packaging step;

FIG. 5 is a perspective view of a cramp unit;

FIG. 6 is a plan view of the camp unit;

FIG. 7 is a schematic diagram explaining a cooperative work in a bag placer;

FIG. 8 is a front view of the bag placer;

FIG. 9 is a side view of the bag placer;

FIGS. 10A and 10B illustrate a normal plastic bag and a paper bag respectively;

FIG. 11 illustrates a process flow from a filling process to sealing process;

FIG. 12 illustrates arrangement of a filling apparatus and a shaping apparatus in the filling process;

FIG. 13 is a plan view of a conveyor unit; and

FIG. 14 is a schematic view showing a work in a deaeration/temporary sealing process.

DETAILED DESCRIPTION

An embodiment of the invention will be described with reference to the accompanying drawings.

Referring to FIGS. 1 and 2, a track type gas-filling

packaging machine P is shown to which the gas-filling packaging method and machine each according to the present invention are applied. The packaging machine P continuously executes shaping during steps from filling a large-sized bag with an article such as about 10 to 20-kilogram rice, pet food or fertilizer and sealing the bag to temporarily sealing a bag mouth, whereby packaging can be executed which achieves stable products that are unlikely to cause collapse when the products are laid out flat. Furthermore, the packaging machine P can automatically execute all works including switch of related apparatus with change in a bag size based on operator's instructions. The packaging process includes a bag feeding step (1), an unzipping step (2) in which a zippered bag is unzipped when the zippered bag is used, a one-point sealing step (3), a bag opening/inflating step (4), a filling step (5), a vibrating/gas filling step (6) and (7), a deaeration/temporary sealing step (8), a first sealing step (9), a second sealing step (10) and a cooling/discharging step (11), as shown in FIGS. 1 and 4A to 4L.

With respect to FIGS. 4A-4L, FIG. 4A illustrates an embodiment of step (1), FIG. 4B illustrates an example height detection printing, FIG. 4C illustrates an embodiment of step (3), FIG. 4D illustrates one example of step (4), FIG. 4E illustrates an example of step (5), FIG. 4F illustrates examples of steps (6) and (7), FIG. 4G illustrates an embodiment of step (8), FIG. 4H represents an embodiment of step (9), FIG. 4I and 4L represent embodiments of discharging outside the system, FIG. 4J represents step (10), and FIG. 4K represents an embodiment of step (11).

The packaging machine P is constructed so that a number of grip units 5 are each horizontally moved along an annular passage 3 including two linear sections 3a and 3b and two semicircular sections 3c and 3d located at opposite ends of the linear sections 3a and 3b respectively, as shown in FIGS. 1 to 3. The packaging machine P is also constructed so that the grip units 5 are intermittently moved for every one of the above-mentioned steps and so that a packaging bag supported by grips 11 of each grip unit 5 in a suspended manner with a bag mouth up is filled with an article and then with an inert gag (nitrogen gas) for

maintenance of quality. The packaging machine P is further constructed so that the bag mouth is heat-sealed. All the steps from the bag placing step to the seal cooling/bag removing step are arranged at one 3a of the linear sections constituting the annular passage 3. Main apparatus and units composing the packaging machine P and essential points of the main apparatus and the units will be described as follows.

Although the packaging machine P divides a bag mouth sealing step into a first sealing step (9) and a second sealing step (10) to maintain the certainty of heat sealing, a single step may be employed, instead of the two steps.

A packaging bag includes a gusset bag having two side edges including respective folded portions, a standing pouch having a bottom including a folded portion, a zippered gusset bag and a zippered standing pouch. Regarding a size of the bag in the embodiment, the width ranges from 300 to 400 mm and the length (height) ranges from 600 to 1050 mm. The folded portion has the length ranging from 100 to 200 mm when expanded.

Each grip unit 5 includes a base 6, a plurality of sets of rollers 7 rotatably mounted on the base 6 as shown in FIGS. 5 and 6. The rollers 7 are attached to the rails 4a and 4b forming the annular passage 3. The base 6 is mounted to an annular conveyor belt 4 driven by a known intermittent drive unit (not shown) including a Geneva drive and a servomotor both incorporated in a machine base 1, so as to be intermittently moved.

A pair of right and left holders 8 are rotatably mounted on the base 6 as shown in FIG. 6. The holders 8 are coupled with

each other by a link 9. The holders 8 are provided with grips 11 having holding portions 12 respectively. A link mechanism 13 includes an actuating lever 13a further including a roller 14. A servomotor drive unit (not shown) is provided for driving the roller 14 so that a pressing member (not shown) is controlled so as to be movable forward and rearward, whereby the holding portions 12 are openable and closable.

Regarding a distance (w) between the holding portions 12 of one set of grips 11, a roller 15 mounted on a lever 8a extending from one of the holders 8 is driven so that a pressing member 17 is controlled so as to be movable forward and rearward, whereby the distance between the holding portions 12 is automatically adjustable according to the bag width. Reference numeral 18 designates a coil spring suspended between the holders 8. The roller 15 is pressed against the pressing member 17 so that the distance (w) between the holding portions 12 is maintained at a constant value.

Bag feeder

A bag feeder (a bag feeding unit) 20 includes a bag replenishing unit 22 which drops into a guide of a bag positioning unit 35 a packaging bag stacked on a magazine 31 and the bag positioning unit 35 which positions a guide according to a bag size entered on an operation panel 2 provided on the packaging machine P. A packaging bag is sent in a predetermined posture to a grip 11 standing by at a bag feeding step (1) by cooperation of the bag supply unit 45 and a cramp unit 50. FIG. 7 shows main work contents of the bag feeder 20.

Referring to FIG. 8, a sucker 24 is movable upward and

downward by a servomotor drive unit (a drive mechanism) 23 mounted on a frame 21. The bag replenishing unit 22 is constructed so that a number of packaging bags set in the magazine in a stacked state are turned up one by one from a top by the sucker 24 thereby to be picked up to a predetermined level. Reference numeral 27 designates a bag chuck which is horizontally movable and is openable and closable by actuation of a cylinder 26. The bag chuck 27 is constructed to grip one of side edges (a side edge near the bag positioning unit) of the bag picked up by the sucker 24 of the bag replenishing unit 22 and to drop the bag into a guide of the adjacent bag positioning unit 35.

The magazine 31 includes chains 30 which are disposed on a frame in parallel to each other in a horizontal direction and are driven by different drive units so as to be capable of normal rotation and reverse rotation. Two side guides 32a and 32b are attached to the chains 30 respectively. Rotational directions of the chains 30 are changed so that a distance between the side guides 32a and 32b is automatically adjusted to a predetermined bag width. A plurality of magazines 31 is configured to be circularly movable from a supply position (L_1) where a bag is filled while a predetermined bag width is maintained or a standby position (L_2) to a replenishing position (L_3) where the side edge of the bag is gripped by the bag chuck 27, when both chains 30 are driven in the same direction.

Positions of the side guides 36 and 37 corresponding to the bag width are automatically adjusted by a servomotor drive unit (not shown) based on entered data, and a position of a rear end guide 38 is automatically adjusted by a servomotor drive unit

39, whereby the bag positioning unit 35 positions the bag. Furthermore, a front end guide 40 at the bag mouth side is provided to automatically switch a position thereof by an actuator 41 so as to correspond to a normal plastic bag or a paper bag. A guide in the embodiment refers to the construction comprised of the side guides 36 and 37 and the front end guide 40.

When the packaging bag is a paper bag, the paper bag is formed into a shape such that a front and a back thereof include respective bag mouth portions having different heights, and the paper bag has an inner surface coated with a resin. The packaging machine P applies a temporary seal to the bag mouth and thereafter, a part of the bag located above the seal is folded and sewn by a sewing unit installed outside the system. Accordingly, since the heights of the bags are not equal and the lower side is the basis in the case of the paper bag, the length (h) from a position where the bag is held by the grips 11 to the bag mouth is adjustable by the front end guide 40 so as to be capable of being rendered larger than the normal plastic bag, as shown in FIG. 10.

An arm 47 is fixed to a shaft 46 controlled by a cam (not shown). The bag supply unit 45 is constructed to reciprocally rotate the arm 47 between a grip position of the bag and a position where the bag is passed to the cramp 56 of the cramp unit 50. Reference numeral 48 designates a chuck mounted on a distal end of the arm 47.

A main shaft 1a (see FIG. 3) controls timing of an entire apparatus or mechanism by a drive mechanism incorporated in the machine base 1 of the packaging machine P. The main shaft 1a is provided with a plurality of cams (not shown). A lever 52

is fixed to a shaft 51 the rotation of which is controlled by a specific one of the cams. The cramp unit 50 includes a base 55 which is provided with a pair of cramps 56 and is movable in a front-back direction by the lever 52 as shown in FIG. 9. The cramps 56 are constructed to be openable and closable by a lever 54 fixed to a shaft 53 the rotation of which is controlled by a cam (not shown). The base 55 is movable upward and downward by a servomotor drive unit 57 based on data detected by a laser sensor 49 provided on the arm 47. As a result, the height of the bag held by the cramps 56 is automatically adjustable to a predetermined dimension. This function is referred to as "bag height compensating function." The bag height compensating function is constructed according as a known mechanism disclosed by Japanese patent application publication No. JP-A-2011-6129 that is an example of a packaging bag feeder by the applicant.

A number of packaging bags set in the magazine in a stacked state are turned up one by one from a top by the sucker 24 of the bag replenishing unit 22 thereby to be picked up to the bag chuck 27. The bag gripped by the bag chuck 27 is transferred to the adjacent bag positioning unit 35 to be dropped into the guide of the unit 35. The side guides 36 and 37 and front and rear end guides 40 and 38 are positioned by automatically adjusting the positions of the side guides 36 and 37 corresponding to the bag width of the guide and the positions of the front and rear end guides 40 and 38 based on the entered data. Next, the bag (a) in the guide is gripped by the chuck 48 of the bag supply unit 45 and is held by the cramp 56 of a cramp unit 50 standing by above to be sent to the grips 11 standing by at the bag feeding

step (1), whereby the bag feeder 20 is constructed.

One-point sealing unit

A one-point sealing unit 60 is provided in a point seal step (3). V-shaped folded portions (c) are formed on both side edges of the gusset bag as shown in FIG. 10. The large-sized bag (a) used with the packaging machine P has a folded portion with a length of 50 mm or 100 mm in a folded state thereof. The lower mouth of the synchronous funnel is inserted into the bag (a) while the bag (a) is open. In this case, if the folded portion (c) protrudes into the inner center of the bag, there is a possibility that the lower mouth may interfere with the folded portion (c). In view of the possibility of interference, the one-point sealing unit 60 is configured to apply heat seal to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, whereby the overlapping portions are fixed together.

Preshaping unit

A bag opening/inflating step (4) is provided with an opening unit 62 which opens the bag by an adsorption action of the suckers 63 which are mounted at both sides of the bag (b) so as to be movable forward and backward respectively and a preshaping unit 65. The preshaping unit 65 is configured to render the bottom of the bag inflated by an adsorption action of the suckers 66 provided at both lower sides so as to be movable forward and backward respectively.

Filler

A filler (a filling unit) 70 is configured to fill the bag with a predetermined amount of the article by the synchronous

funnel 77 which is controlled to be moved upward and downward and horizontally in synchronization with transfer of the bag. In more detail, an annular conveyor belt 72 extending between a pair of pulleys 71 disposed at a predetermined distance therebetween as viewed in a plane view is provided with a lifting unit 73. The lifting unit 73 includes a slide 76 on which is mounted the synchronous funnel 77 provided with a filling nozzle 78. The lifting unit 73 includes a lower end 73b movably attached to a rail 75 forming a second annular passage 70a. The lifting unit 73 is controlled by a servomotor drive unit 74 so as to be moved upward and downward in synchronization with transfer of the bags. Furthermore, the lifting unit 73 is also controlled by a servomotor drive unit (not shown) so as to be moved horizontally.

Bottom tapping unit:

Bottom tapping units 80 are disposed at a bag filling step (9), a vibrating/gas filling step (6) and (7) and an aeration/temporary seal step (8) respectively (FIGS. 11 and 12). The bottom tapping units 80 are configured to move a receiving member 83 by converting a rotational movement by the servomotor drive unit 81 installed at the machine base 1 side to a linear movement by a crank mechanism 82. Reference numeral 85 designates a servomotor drive unit moves the bottom tapping unit 80 attached to a vertically disposed guide member 84 thereby to adjust the height.

In the filling step (5), the synchronous funnel 77 is lowered by driving the servomotor drive unit 74 to be inserted into the bag, and the receiving member 83 of the bottom tapping unit 80

is applied to the bottom of the bag and the bag is tapped so that the article is prompted to drop, and the bag is filled via the synchronous funnel 77 with a predetermined amount of article discharged from a weighing apparatus (not shown).

A filling unit 70 is constructed to insert the synchronous funnel 77 into the bag by lowering the synchronous funnel 77 by the drive of the servomotor drive unit 74 and to fill the bag with a predetermined amount of an article discharged from a weighing apparatus (not shown) in the filling step (5) while helping the article drop by applying the receiving member 83 of the bottom tapping unit 80 to tap the bag and to start to supply an inert gas into the bag by a gas nozzle at a last moment of the filling operation.

Shaping apparatus

A shaping apparatus (a shaping unit) is configured to shape the bag into a desired form, for example, the form of a rectangular parellelepiped by cooperation of the bottom tapping unit 80 and at least one pair of, in the embodiment, three pairs, of conveyor units 91 which are controlled so as to hold one or a plurality of bags and so that a rotational speed thereof is synchronized with the transfer speed of the bags, from the bag filling step (5) to the aeration/temporary seal step (8), as shown in FIG. 11. As the result of application of the above-described shaping, collapse of packaged products is avoided when the products are laid out flat.

The conveyor units 91 are supported on bearing members 92 disposed on the machine base 1 at predetermined intervals so that guide bars 93 are movable forward and rearward in a direction

perpendicular to a direction (x) in which the bags are fed, as shown in FIGS. 12 and 13. Side conveyors 98 are mounted on a base 94 fixed to distal ends of the guide bars 93. Reference numeral 96 designates a ball screw whose rotation is controlled by a servomotor drive unit 95. The ball screw 96 has a distal end which is rotatably mounted on the base 94. In the side conveyor 98, plastic chains 100 extend between pulleys 99 disposed in parallel to the feed direction (x) of the bags at predetermined intervals. The side conveyors 98 are configured to synchronize rotational speeds of the plastic chains 100 with the transfer speed of the bags. The side conveyors 98 are disposed at the front and the back of the passing bag respectively and are configured to be rotated in the same direction as the feed direction (x) of the bags, as shown in FIG. 13.

Movable bag-mouth auxiliary opening unit

A movable bag mouth auxiliary opening unit 105 includes a base 106 on which are mounted small-sized suckers 107 and bag mouth pressing members 108 closing the bag mouth other than an open portion into which an aeration nozzle is insertable as shown in FIGS. 11 and 14. The base 106 is configured to be movable forward and backward by driving an actuator (not shown). The actuator is configured to be reciprocable by a servomotor drive unit (not shown) between the vibrating/gas filling step (7) and the deaeration/temporary seal step (8). The sucker 107 and the bag mouth pressing members 108 are disposed so as to correspond to the front and the back of the bag respectively.

A movable bag mouth auxiliary opening unit 105 is configured so that part of the bag mouth is opened by an adsorption action

of suckers 107 provided at both sides of the bag so as to be movable forward and backward, with the result that a deaeration nozzle 110 is insertable into the bag and so that the part of the bag mouth other than the opened part is closable.

In the deaeration/temporary seal step (8), the deaeration nozzle 110 is inserted into the bag to remove air remaining in the bag and is then pulled out of the bag, and thereafter, the bag is held by a temporary heater 112 of a temporary seal unit so that temporary seal is applied to the bag.

The seal unit includes a first sealing unit installed at the first sealing step (9) and a second sealing unit installed at the second sealing step (10). Heat seals are applied to a part of the bag where the temporary seal has been applied, by heaters 113 and 114 of the first and second sealing units respectively.

A cooling seal unit is configured to cool the part of the bag where heat seal has been applied by the seal unit, by cooling lever 115 as well known in the art.

Thus, the track gas-filling packaging machine according to the invention is constructed so that:

a size and a type of the packaging bag and a type of the article are entered on the operation panel 2;

in the bag feeding step (1) (see FIG. 7), a number of packaging bags set in the magazine 31 in a stacked state are turned up one by one from a top by the sucker 24 of the bag replenishing unit 22 thereby to be picked up and then passed to the bag chuck 27, the sucker 24 being controlled so as to be moved in an up-down direction, and the packaging bag grasped by the bag chuck 27 is transferred

to the adjacent bag positioning unit 35 to be thrown into the guide of the positioning unit, and the packaging bag is positioned by automatically adjusting positions of the side guides 36 and 37 corresponding to the bag width and positions of the front end guide 40 and the rear end guide 38 at the bag mouth side corresponding to a bag length based on the entered data, and the packaging bag in the guide is gripped by a chuck 48 of the bag supply unit 45 and is held by a cramp 56 of a cramp unit 50 standing by above with the bag mouth up to be sent from the cramp 56 to the grips 11 standing by at the bag placing step;

in a bag opening/inflating step (4), the bag mouth is opened by an adsorption action of suckers 63 and inflating the bottom of the bag by the adsorption action of the suckers 63;

in an article filling step (5), a synchronous funnel 77, which is controlled for up-down movement and horizontal movement in synchronization with transfer of the bag to be inserted into the bag is lowered to be inserted into the bag, is lowered, and a receiving member 83 of a bottom tapping unit 80 is applied to the bottom of the bag, whereby the bag is filled with a predetermined amount of article while the bottom is tapped so that the article is helped to fall,

wherein an inert gas is continuously discharged from a gas discharge nozzle 78 provided on the synchronous funnel 77 into the bag, during a period from a last moment of the filling operation to a plurality of subsequent steps. The bag is shaped into a desired shape by a cooperative work of the bag tapping unit 80 and a shaping unit provided with at least a pair of conveyor units 91 which are controlled so as to hold one or a

plurality of packaging bags and so as to be controlled so that a rotational speed synchronizes a transfer speed of the packaging bag, during a period from the bag filling step (5) and to the deaeration/temporally sealing step (8), and the funnel 77 and the gas-filling nozzle 78 are caused to get out of the bag and a part of the bag mouth is kept open by the adsorption action of the suckers 107, while the bag is moved to the deaeration/temporarily sealing step (8),

in a deaeration/temporarily sealing step (8), a deaeration nozzle 110 is inserted into the bag to remove air remaining in the bag, causing the deaeration nozzle 110 to get out of the bag, holding the bag mouth by a temporary heater 112 so that a temporary seal is applied to the bag mouth;

in a first seal step (9) and a second seal step (10), heat seal is applied to a temporarily sealed part of the bag; and

in a seal cooling/bag removing step (11), the heat-sealed part is cooled and the bag (a') as a product is removed outside the system, whereby a work of changing related apparatus with change in the bag size can full-automatically be carried out.

The grips 11 are opened in the point seal step (3) to discharge the bag outside the system at 61 when a bag supported by the grips 11 does not have a predetermined height, when a chuck of a zipper of a zippered bag is undone or when the bag is supported by only one grip 11. Furthermore, the grips 11 are opened in the first seal step (9) to discharge the bag outside the system at 64 when the bag supported by the grips 11 is defective in the opening of the bag mouth or in the inflating of the bag. Still furthermore, when the article filling the bag contains any metal,

the grips 11 are opened in the first seal step (9) based on a detecting operation of a metal detector (not shown), whereby the bag is discharged outside the system at 67. Where the seal of the bag is defective, the bag is discharged outside the system at 69.

The bag filled with the article weighs 15 to 20 kg, and there is a possibility that an upper part of the bag may stretch when supported by only the grips 11. In view of this, a group of conveyors 120 are disposed to support the bottom of the bag from the first seal step (9) to the cooling/discharge step (11). Reference numeral 121 designates a discharge conveyor.

Since the operation of the track gas-filling packaging machine P according to the invention is described in relation (9) to the construction of the main apparatus and the units, the description of the operation will be eliminated.

The foregoing description and drawings are merely illustrative of the present disclosure and are not to be construed in a limiting sense. Various changes and modifications will become apparent to those of ordinary skill in the art. All such changes and modifications are seen to fall within the scope of the appended claims.

The embodiments of the present invention for which an exclusive property or privilege is claimed are defined as follows:

1. A gas-filling packaging method using a track type gas-filling packaging machine in which a number of grip units are provided each horizontally movable along an annular passage including two linear sections and semicircular sections located at opposite ends of the linear sections, the grip units being intermittently moved for every one of a plurality of work steps, and a packaging bag supported by grips of each grip unit in a suspended manner with a bag mouth up is filled with an article and then with a gas, and the bag mouth is heat-sealed, wherein the packaging bag includes a gusset bag having two side edges including respective folded portions, a standing pouch having a bottom including a folded portion or a zippered bag which is the gusset bag provided with a zipper or the standing pouch provided with a zipper, and a size and a type of the packaging bag and a type of the article are entered on an operation panel, the method comprising:

a bag feeding step in which a number of packaging bags set in a magazine in a stacked state are turned up one by one from a top by a sucker of a bag replenishing unit thereby to be picked up and then passed to a bag chuck, the sucker being controlled so as to be moved in an up-down direction, and the packaging bag grasped by the bag chuck of a bag supply unit is transferred to an adjacent bag positioning unit to be thrown into a guide of the positioning unit, and the packaging bag is positioned by automatically adjusting a position of a side guide corresponding to a bag width of the guide and positions of a front end guide and a rear end guide at the bag mouth side corresponding to a bag length based on the entered data, and the packaging bag in the guide is gripped by the chuck of the bag supply unit and is held by a cramp of a cramp unit standing by above and having a bag height compensating function to be sent from the cramp to the grips standing by at the bag placing step;

a bag opening/inflating step of opening the bag mouth by an adsorption action of suction discs and inflating the bottom of the bag by the adsorption action of the suction discs;

a bag filling step of lowering a synchronous funnel which is controlled for up-down movement and horizontal movement in synchronization with transfer of the bag to be inserted into the bag and applying a receiving member of a bottom tapping unit, whereby the bag is filled with a predetermined amount of the article while the bottom is tapped so that the article is prompted to fall,

wherein an inert gas is continuously discharged from a gas discharge nozzle provided on the synchronous funnel into the bag, during a period from a last moment of the filling operation to a plurality of subsequent steps;

wherein the bag is shaped into a desired shape by a joint work between the bag tapping unit and a shaping unit provided with at least a pair of conveyor units which are controlled so as to hold one or a plurality of packaging bags and so as to be controlled so that a rotational speed synchronizes a transfer speed of the packaging bag, during a period from the bag filling step and to a deaeration/temporary sealing step;

wherein the funnel and the gas nozzle are removed from the bag and a part of the bag mouth is kept open by the adsorption action of the suction discs, while the bag is moved to the deaeration/temporary sealing step, the method further comprising:

the deaeration/temporary sealing step of inserting a deaeration nozzle into the bag to remove air remaining in the bag, removing the deaeration nozzle from the bag, holding the bag mouth by a temporary heater so that a temporary seal is applied to the bag mouth;

a bag mouth sealing step of heat-sealing the temporary sealed part; and

a seal cooling/bag removing step of cooling the heat-sealed part and subsequently removing the bag outside the system.

2. The method according to claim 1, wherein the bag replenishing unit includes a plurality of magazines each of which has an accommodation space automatically adjustable according to a size of the bag, wherein the magazines are circulated from a supply position where the magazines are charged with bags to a replenishing position where the bags are taken out of the magazines by the bag chuck.

3. The method according to claim 1 , wherein the grip units include spaced apart paired right and left holding portions supporting the bag, wherein a distance between the right and left holding portions is automatically adjusted according to a size of the bag.

4. The method according to claim 2 , wherein the grip units include spaced apart paired right and left holding portions supporting the bag wherein a distance between the right and left holding portions is automatically adjusted according to a size of the bag.

5. The method according to claim 1, wherein when the bag is the zippered gusset bag, after the bag has been supplied, the bag is unzipped and a point seal is applied to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, whereby the overlapping portions are fixed together.

6. The method according to claim 1, wherein in the bag mouth sealing step, the bag mouth is heat-sealed in a first sealing substep and thereafter, the bag mouth is also heat-sealed in a second sealing substep.

7. The method according to claim 2, wherein in the bag mouth sealing step, the bag mouth is heat-sealed in a first sealing substep and thereafter, the bag mouth is also heat-sealed in a second sealing substep.

8. The method according to claim 1, wherein all the steps from the bag placing step to the seal cooling/bag removing step are arranged at one of the linear sections constituting the annular passage.

9. The method according to claim 2, wherein all the steps from the bag placing step to the seal cooling/bag removing step are arranged at one of the linear sections constituting the annular passage.

10. The method according to claim 1, wherein when the bag is a paper bag, the paper bag is formed into a shape such that a front and a back thereof include respective bag mouth portions having different heights, and the paper bag has an inner surface coated with a resin; and

in the deaeration/temporary sealing step, the temporary seal is applied to the bag mouth and thereafter, a part of the bag located above the seal is folded and sewn by a sewing unit installed outside the system.

11. The method according to claim 2, wherein when the bag is a paper bag, the paper bag is formed into a shape such that a front and a back thereof include respective bag mouth portions having different heights, and the paper bag has an inner surface coated with a resin; and

in the deaeration/temporary sealing step, the temporary seal is applied to the bag mouth and thereafter, a part of the bag located above the seal is folded and sewn by a sewing unit installed outside the system.

12. A gas-filling packaging machine which is of a track type in which a number of grip units each horizontally movable along an annular passage including two linear sections and semicircular sections located at opposite ends of the linear sections, the grip units being intermittently moved for every one of a plurality of work stages, and a packaging bag supported by grips of each grip unit in a suspended manner with a bag mouth up is filled with an article and then with a gas, and the bag mouth is heat-sealed, wherein the packaging bag includes a gusset bag having two side edges including respective folded portions, a standing pouch having a bottom including a folded portion or a zippered bag which is the gusset bag provided with a zipper or the standing pouch provided with a zipper, the machine comprising:

an operation panel on which a size and a type of the packaging bag and a type of the article are entered;

a bag replenishing unit which turns up a number of packaging bags set in a magazine in a stacked state, one by one from a top by a sucker movable in an up-down direction, picks up and then passes the bags to a horizontally movable bag chuck, and transfers the bag grasped by the bag chuck to an adjacent bag positioning unit to throw the bag into a guide of the positioning unit;

the bag positioning unit automatically adjusting a position of a side guide corresponding to a bag width of the guide and positions of a front end guide and a rear end guide at the bag mouth side corresponding to a bag length based on the entered data;

a bag feeding unit which grips the bag in the guide by the chuck of a bag supply unit, causes a cramp of a cramp unit standing by above and having a bag height compensating function to hold the bag with the bag mouth up to send the bag to the grip standing by at a bag feeding step;

an opening unit which opens the bag mouth by an adsorption action of first suckers provided at both sides of the bag so that suckers are movable forward and backward;

a preshaping unit which inflates a bottom of the bag by an adsorption action of second suckers provided below both sides of the bag;

a filling unit which fills the bag with a predetermined amount of the article by a synchronous funnel which is controlled to be moved upward and downward and horizontally in synchronization with transfer of the bag, the filling unit also brings an inert gas into the bag by a gas nozzle provided on the funnel during a period from a last moment of the filling operation to a plurality of subsequent steps;

a shaping unit which shapes the bag into a desirable shape by a joint work between a bag tapping unit and at least a pair of conveyor units during a period from the bag filling step and to a deaeration/temporary sealing step, said bag tapping unit including a receiving member applied to the bottom of the bag and tapped so that the article is prompted to fall, said conveyor units being controlled so as to hold one or a plurality of bags and so that a rotating speed synchronizes with a transfer speed of the bag;

a movable bag mouth auxiliary opening unit which opens part of the bag mouth by an adsorption action of suckers which are provided at both sides of the bag mouth so as to be movable forward and backward, so that a deaeration nozzle is insertable, the auxiliary opening unit being capable of closing the part of the bag other than the open part;

a temporary sealing unit which holds the bag mouth by a temporary heater to apply a temporary seal to the bag mouth;

a main sealing unit which applies a heat seal to the temporary sealed part of the bag; and

a cooling unit which cools the heat-sealed part of the bag.

13. The machine according to claim 12, wherein the bag replenishing unit includes a plurality of magazines each of which has an accommodation space automatically adjustable according to a size of the bag, wherein the magazines are circulated from a supply position where the magazines are charged with bags to a replenishing position where the bags are taken out of the magazines by the bag chuck.

14. The machine according to claim 12, wherein the magazines are provided with chains which are disposed in parallel to each other in a horizontal direction and are driven by different drive units so as to be capable of normal rotation and reverse rotation;

the side guides are attached to the respective chains, and rotating directions of the chains are opposed to each other so that a distance between the side guides is automatically adjusted to a predetermined bag width; and

when the chains are rotated in one and the same direction, the side guides are circulated with the predetermined bag width being maintained.

15. The machine according to claim 13, wherein the magazines are provided with chains which are disposed in parallel to each other in a horizontal direction and are driven by different drive units so as to be capable of normal rotation and reverse rotation;

the side guides are attached to the respective chains, and rotating directions of the chains are opposed to each other so that a distance between the side guides is automatically adjusted to a predetermined bag width; and

when the chains are rotated in one and the same direction, the side guides are circulated with the predetermined bag width being maintained.

16. The machine according to claim 12, wherein each grip unit includes spaced apart paired right and left holding portions supporting the bag wherein a distance between the right and left holding portions is automatically adjusted according to a size of the bag.

17. The machine according to claim 13, wherein each grip unit includes spaced apart paired right and left holding portions supporting the bag wherein a distance between the right and left holding portions is automatically adjusted according to a size of the bag.

18. The machine according to claim 12, wherein when the bag is the zippered gusset bag, the chuck is opened at a chuck opening step after bag supply, the machine further comprising a one-point sealing unit which applies a one-point seal to overlapping portions of the front or the back of the bag and one of V-shaped folded portions of both side edges of the bag, thereby fixing the overlapping portions together.

19. The machine according to claim 12, wherein the bag mouth sealing unit includes a first sealing unit and a second sealing unit.

20. The machine according to claim 12, wherein all the units from the bag feeding unit to the cooling unit are arranged at one of the linear sections constituting the annular passage.

FIG. 1

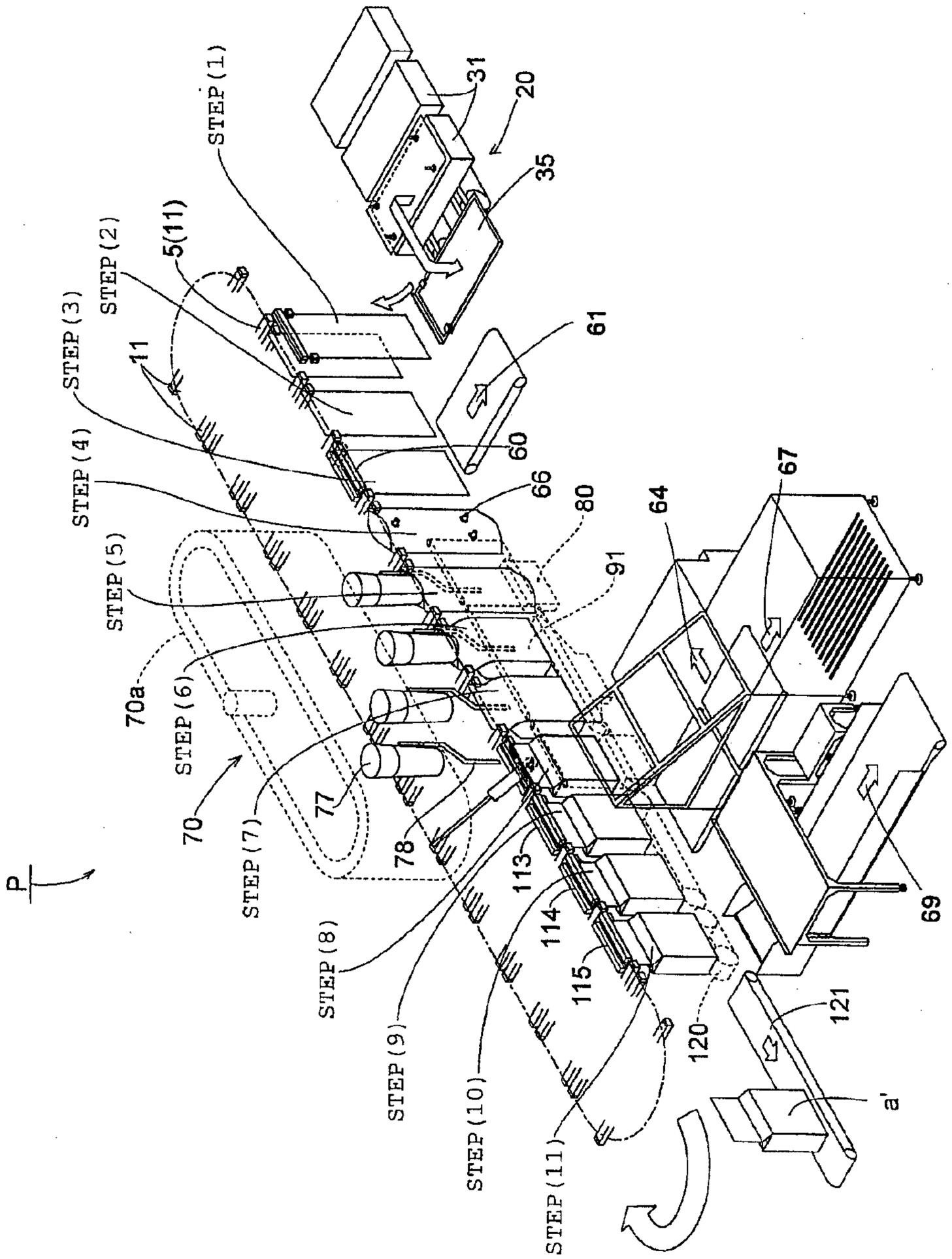

P
STEP(1)
STEP(2)
STEP(3)
STEP(4)
STEP(5)
STEP(6)
STEP(7)
STEP(8)
STEP(9)
STEP(10)
STEP(11)
5(11)
11
70
70a
77
78
80
91
60
61
66
67
64
69
113
114
115
120
121
31
20
35
a'

FIG.2

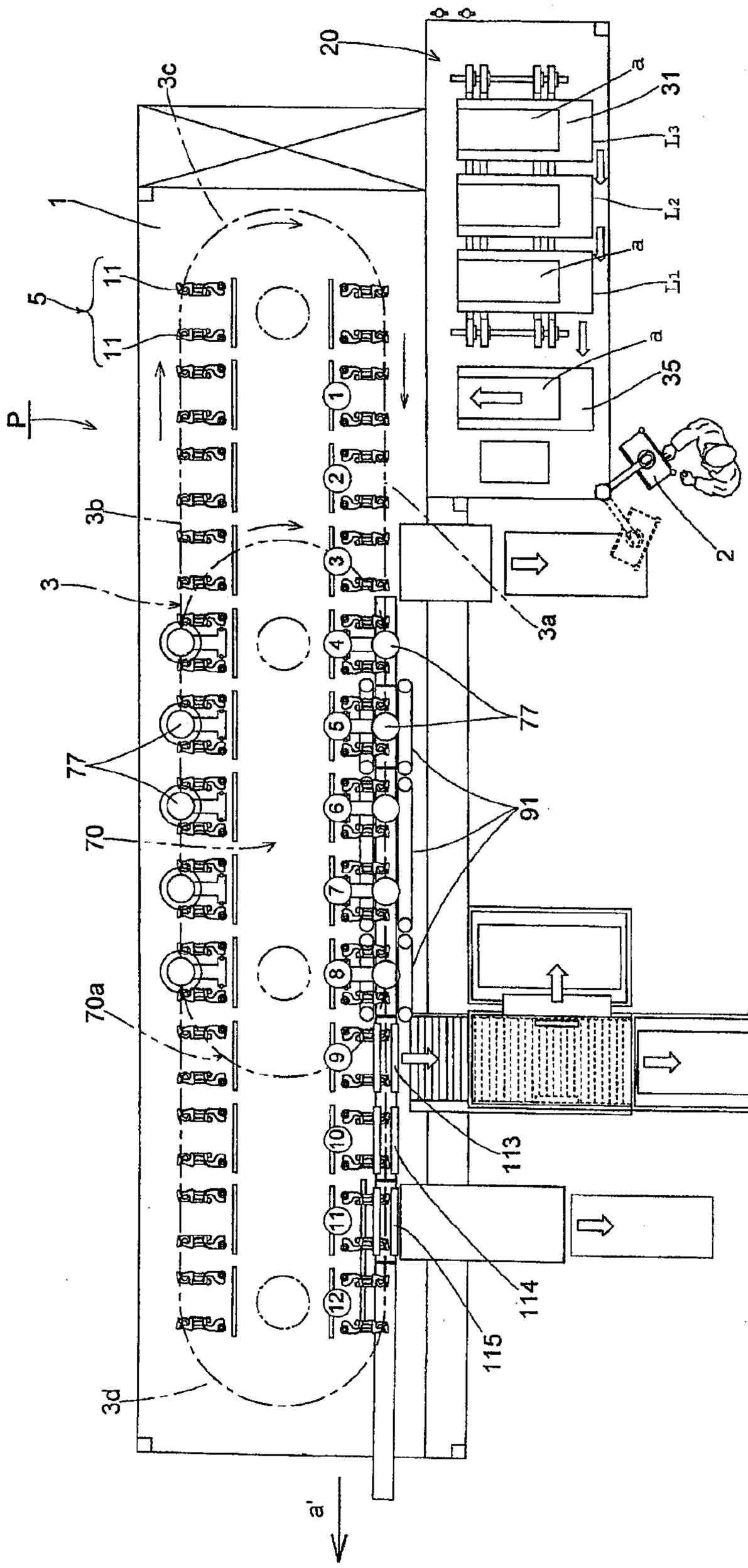

20
3c
1
5
11
11
P
3b
3
77
70
70a
3d
a'
a
31
L_3
L_2
L_1
35
2
3a
77
91
113
114
115
1
2
3
4
5
6
7
8
9
10
11
12

FIG.3

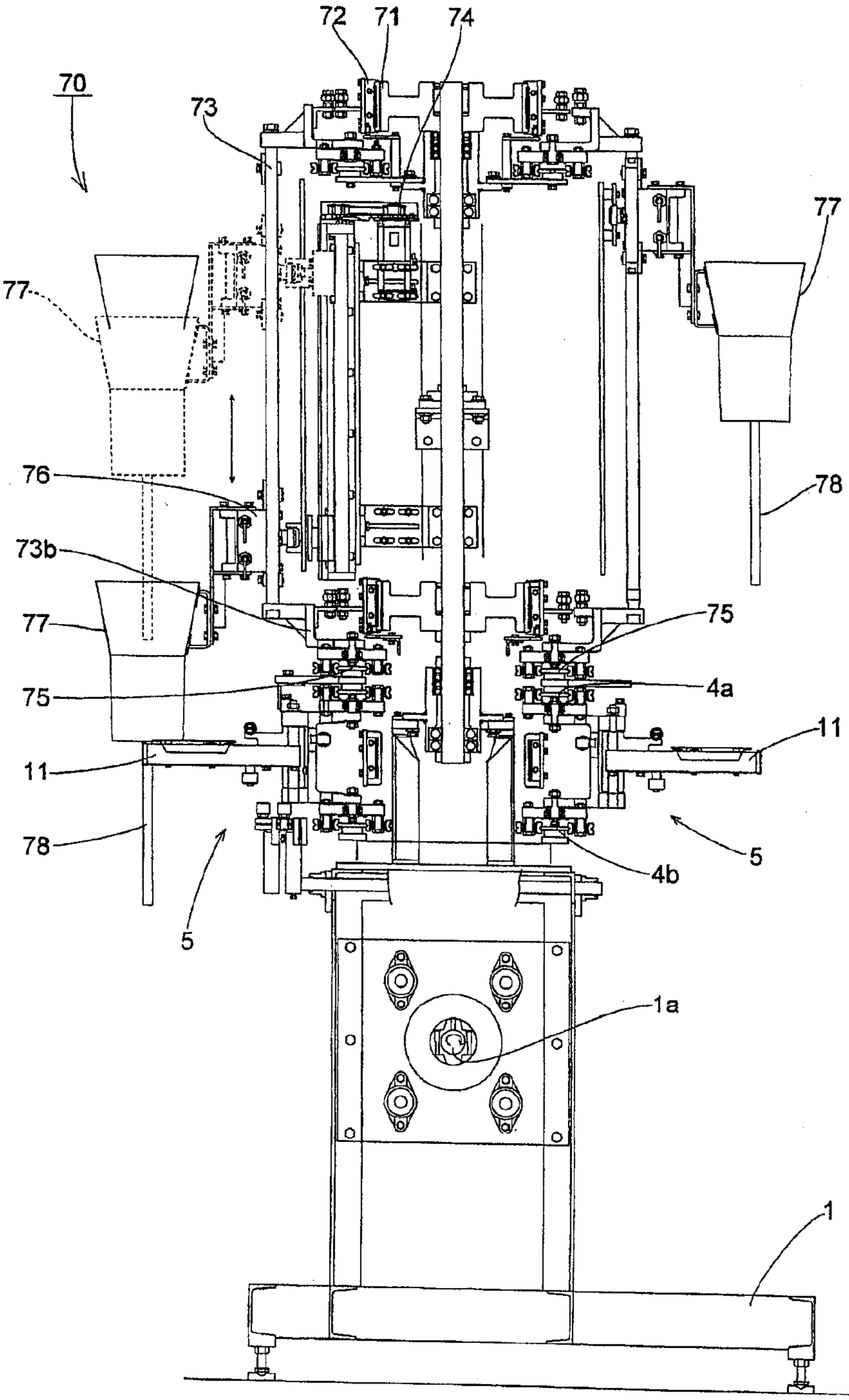


FIG. 4

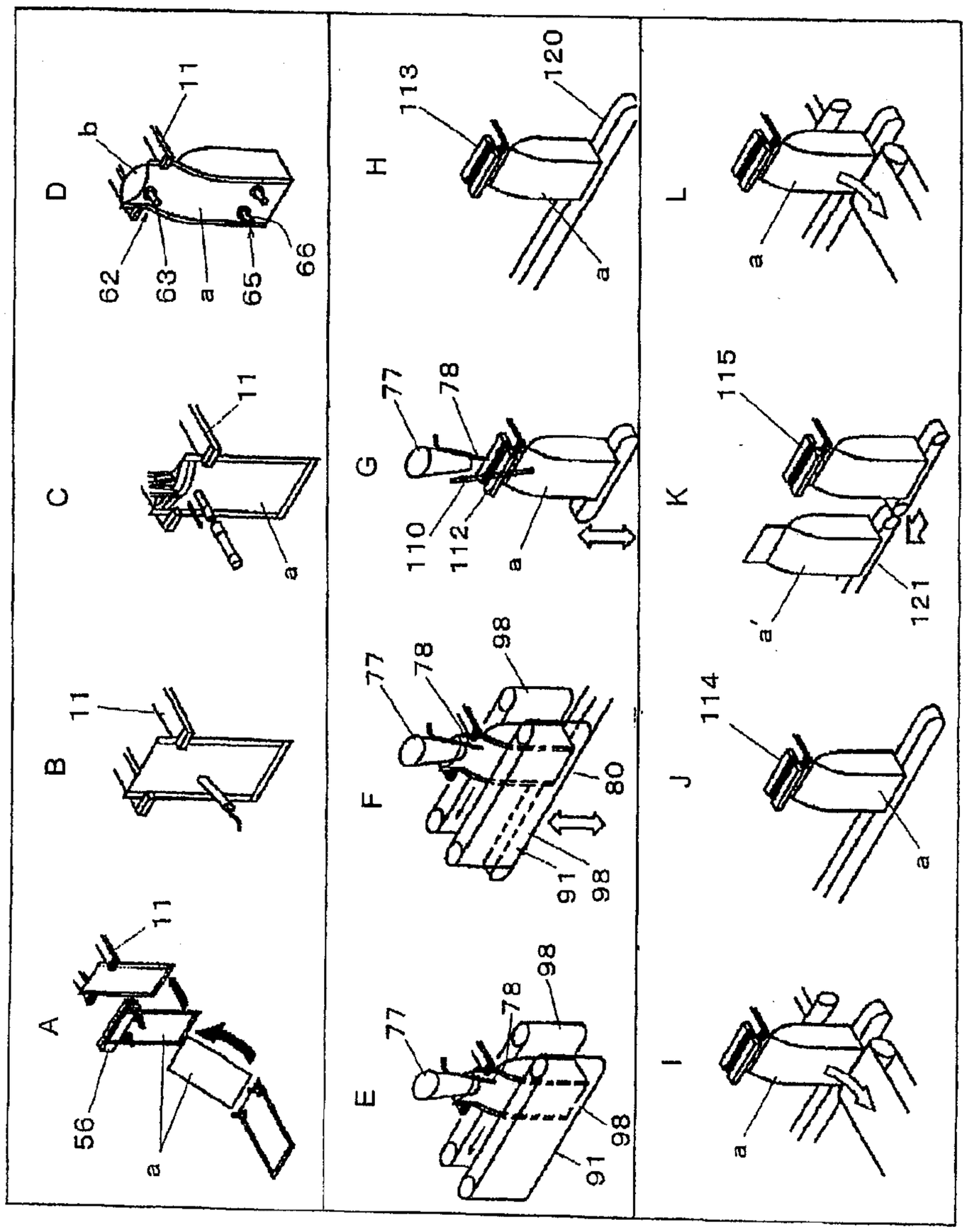

A
56
a
B
11
C
11
a
D
b
11
62
63
a
65
66
E
77
78
98
91
98
F
77
78
98
80
91
98
G
77
78
110
112
a
H
113
120
a
I
a
J
114
a
K
115
a'
121
L
a

FIG.5

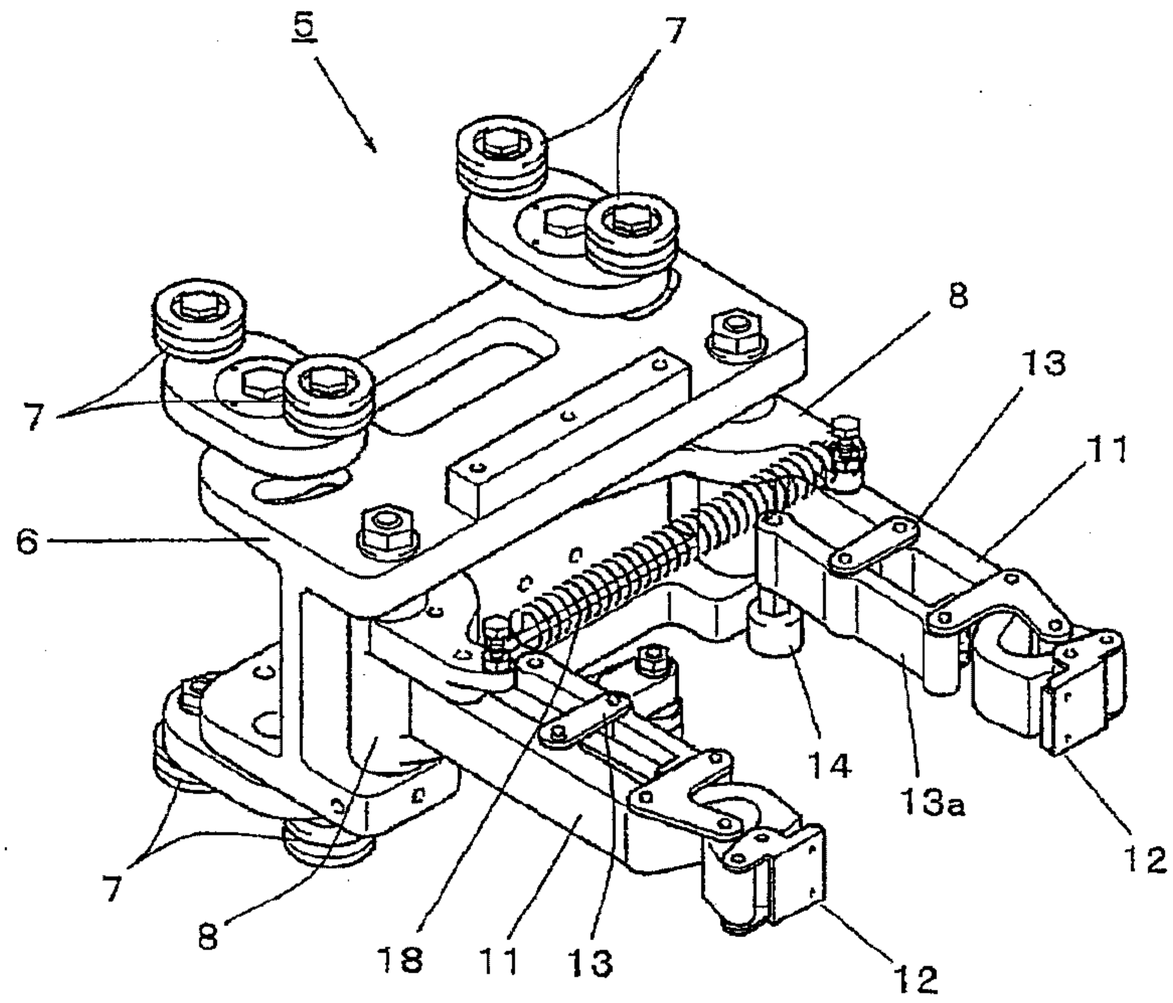


FIG.6

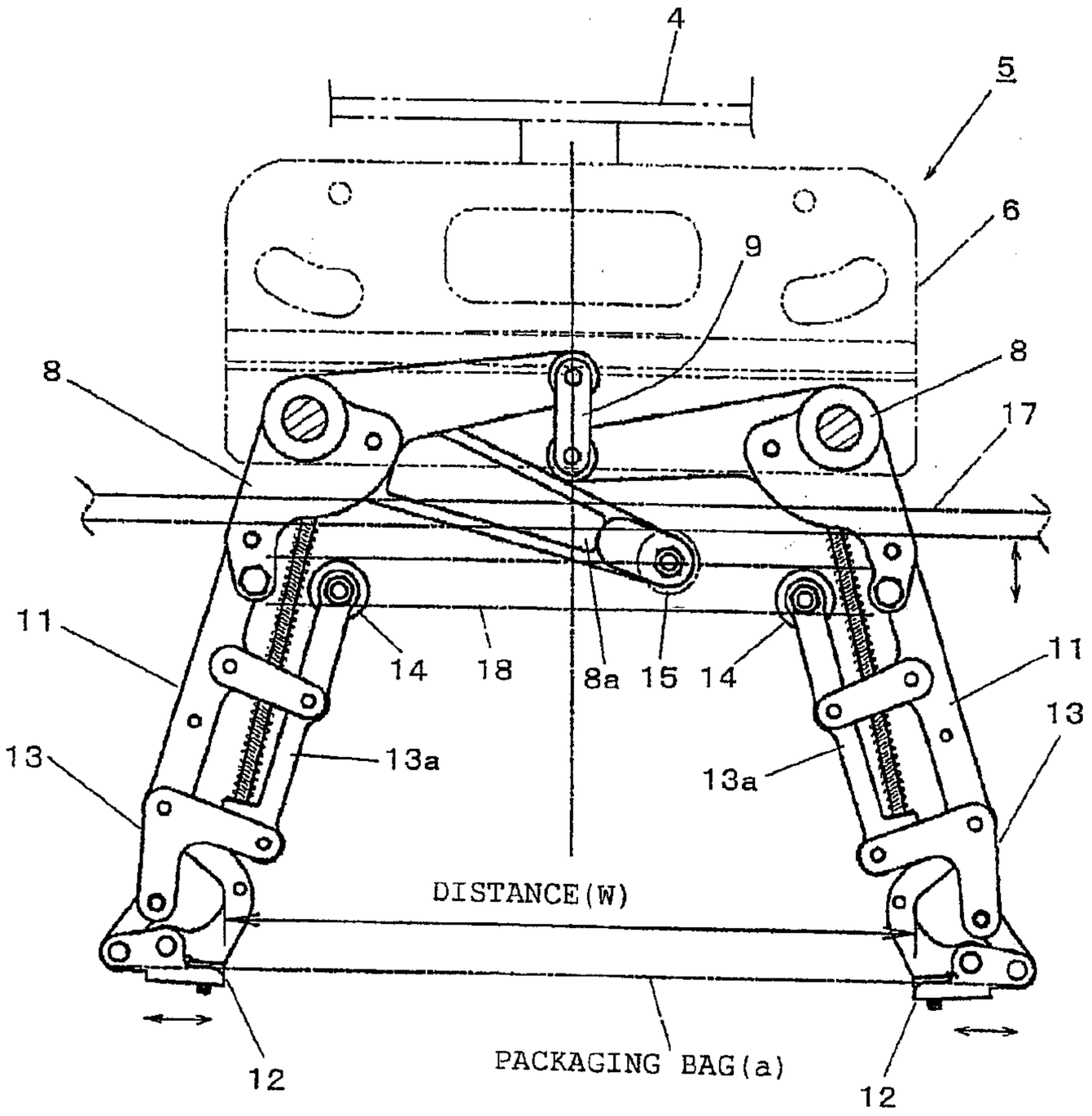

4
5
6
9
8
8
17
11
14
18
8a
15
14
11
13
13a
13a
13
DISTANCE(W)
PACKAGING BAG(a)
12
12

FIG. 7

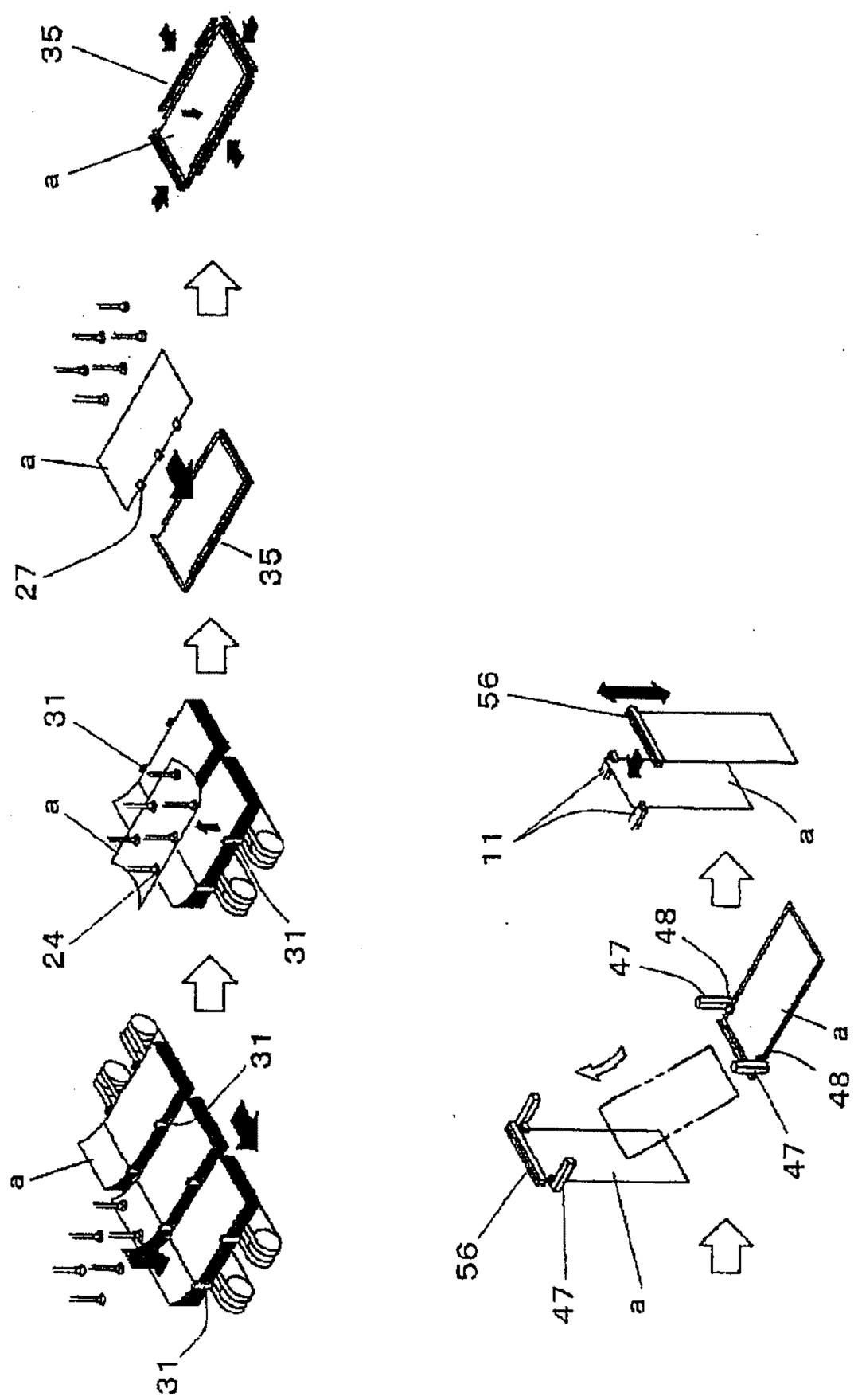


FIG.8

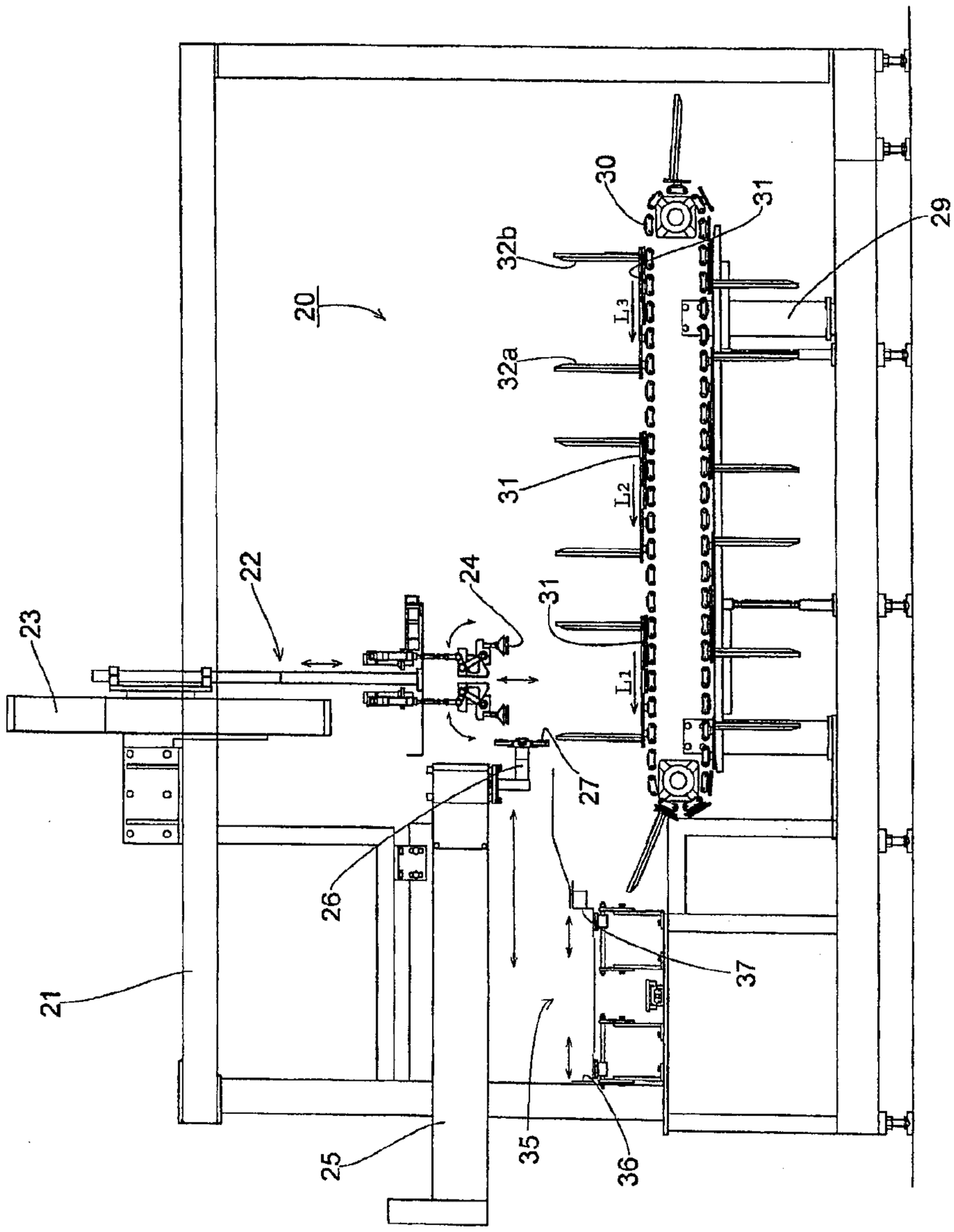


FIG. 9

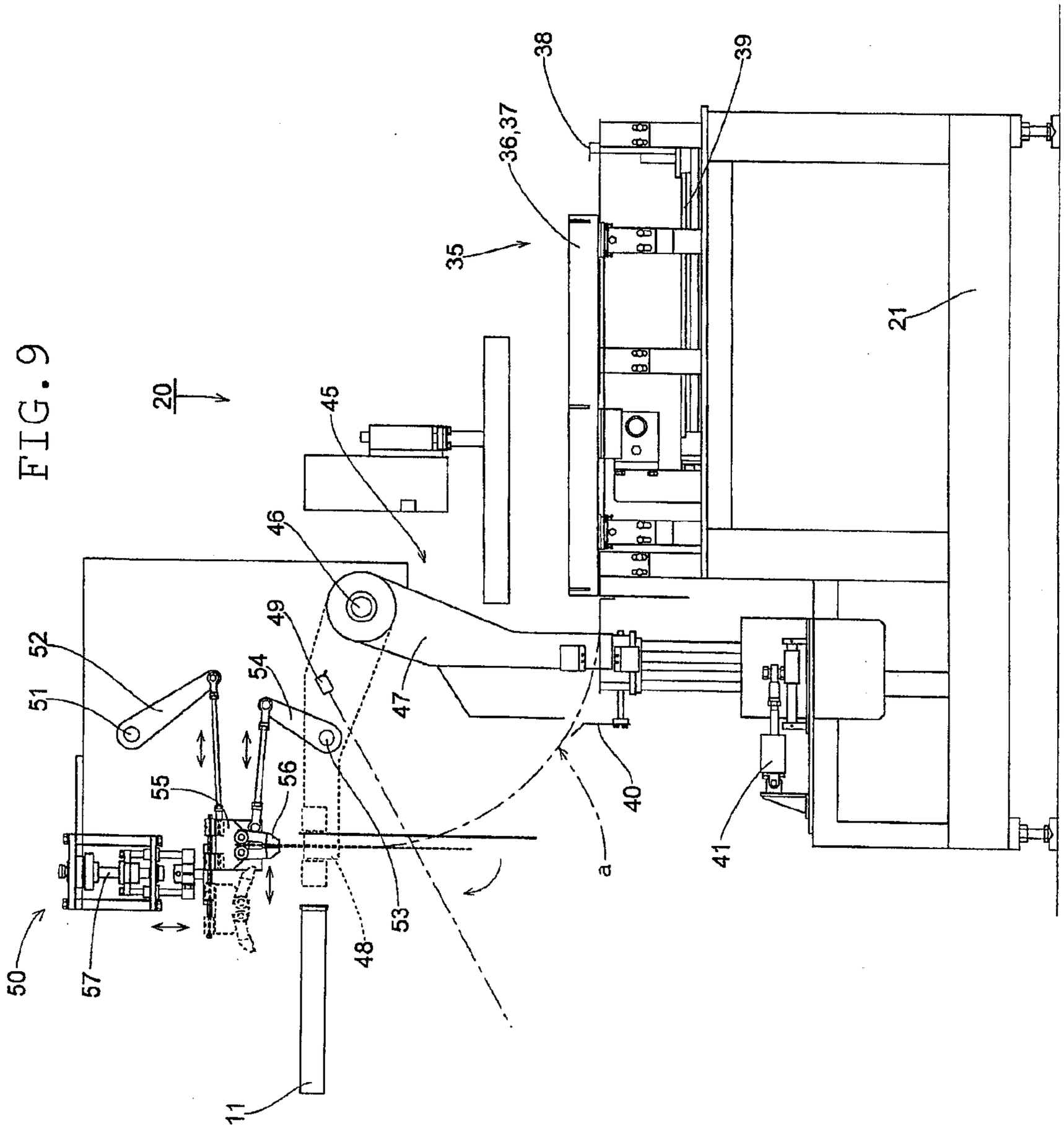
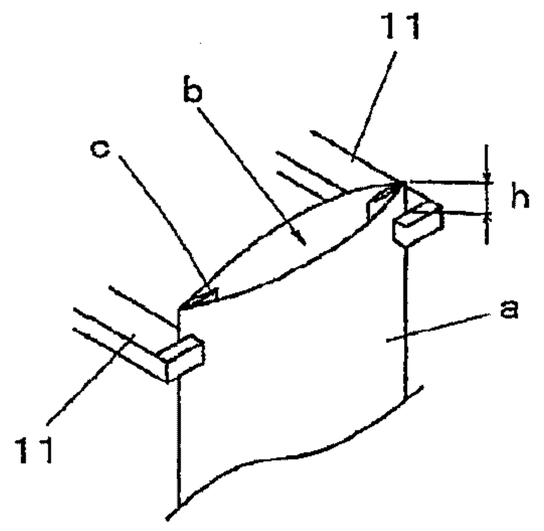
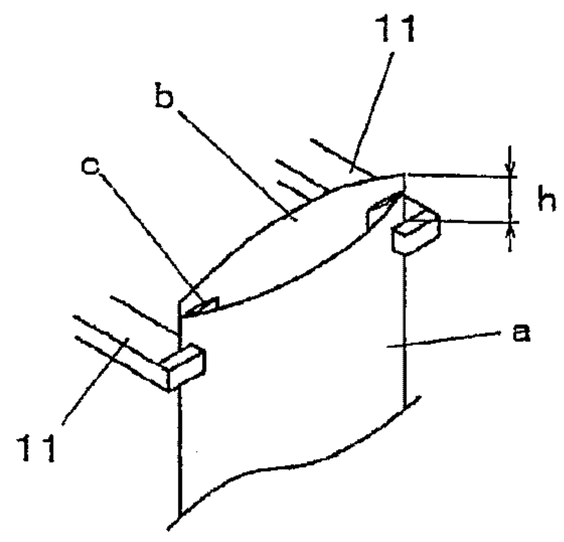


FIG.10



(1) NORMAL PLASTIC BAG



(2) PAPER BAG

FIG.11

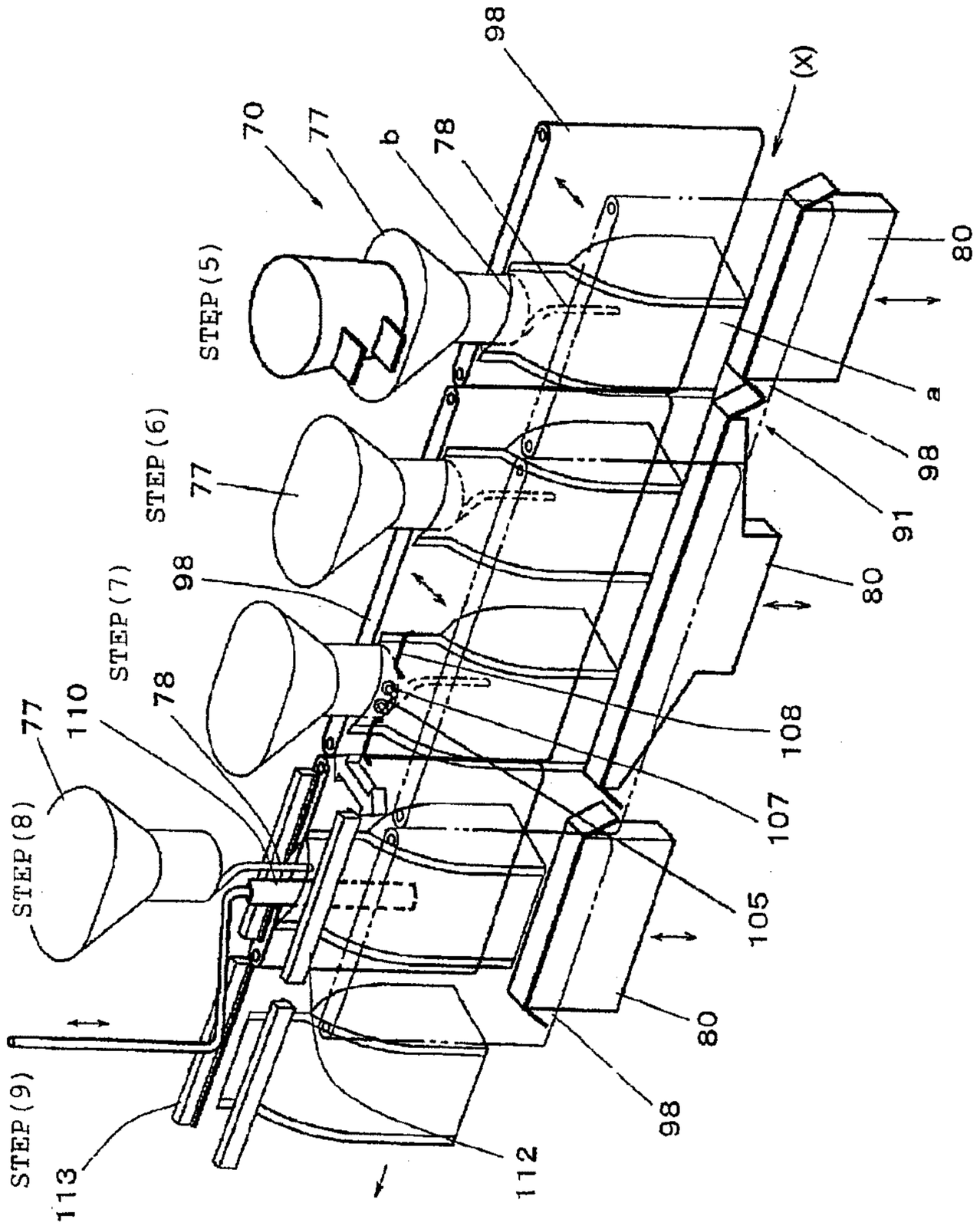

98
(X)
70
77
b
78
STEP(5)
STEP(6)
STEP(7)
STEP(8)
STEP(9)
80
a
91
108
107
105
110
112
13

FIG.12

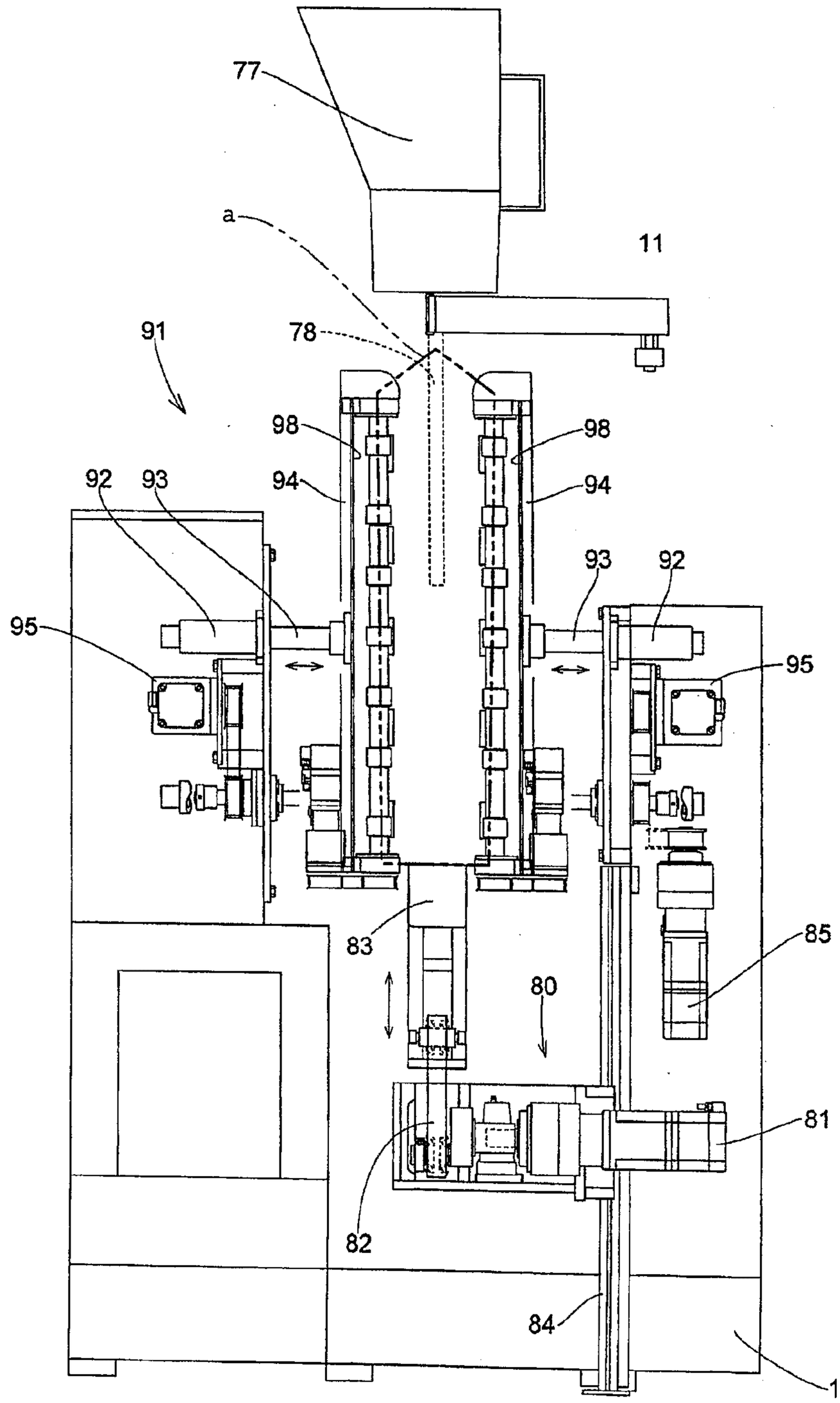


FIG.13

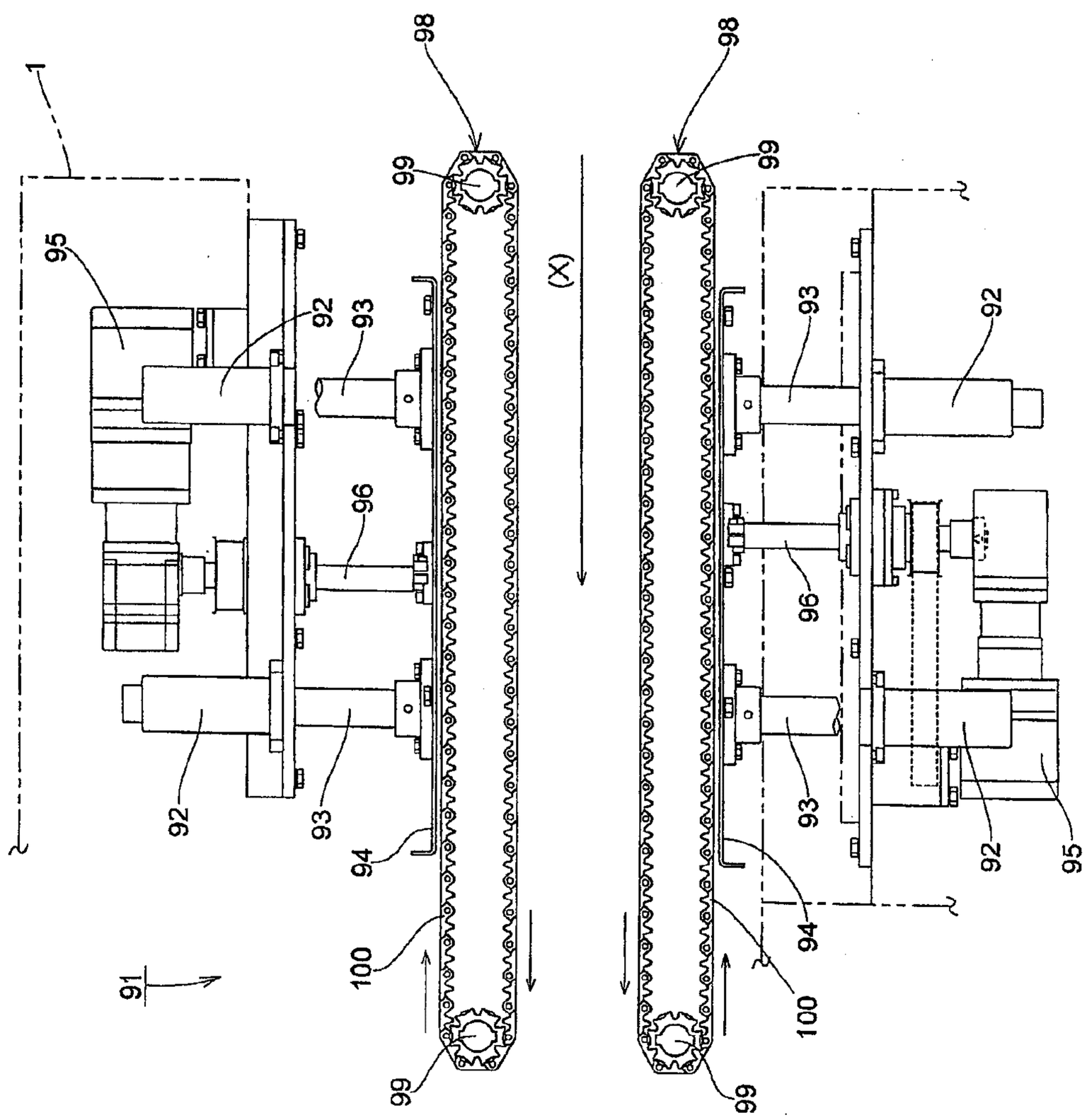
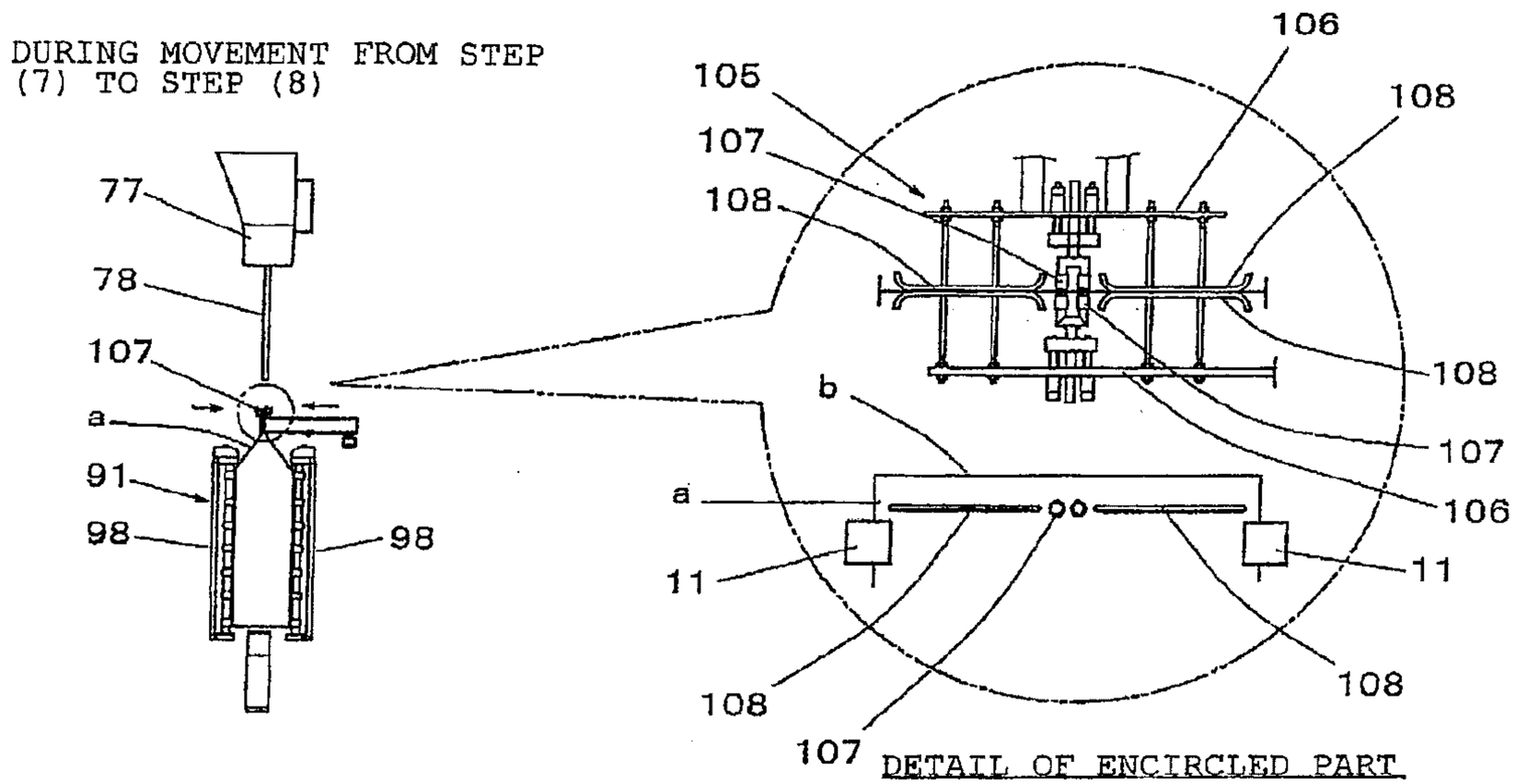
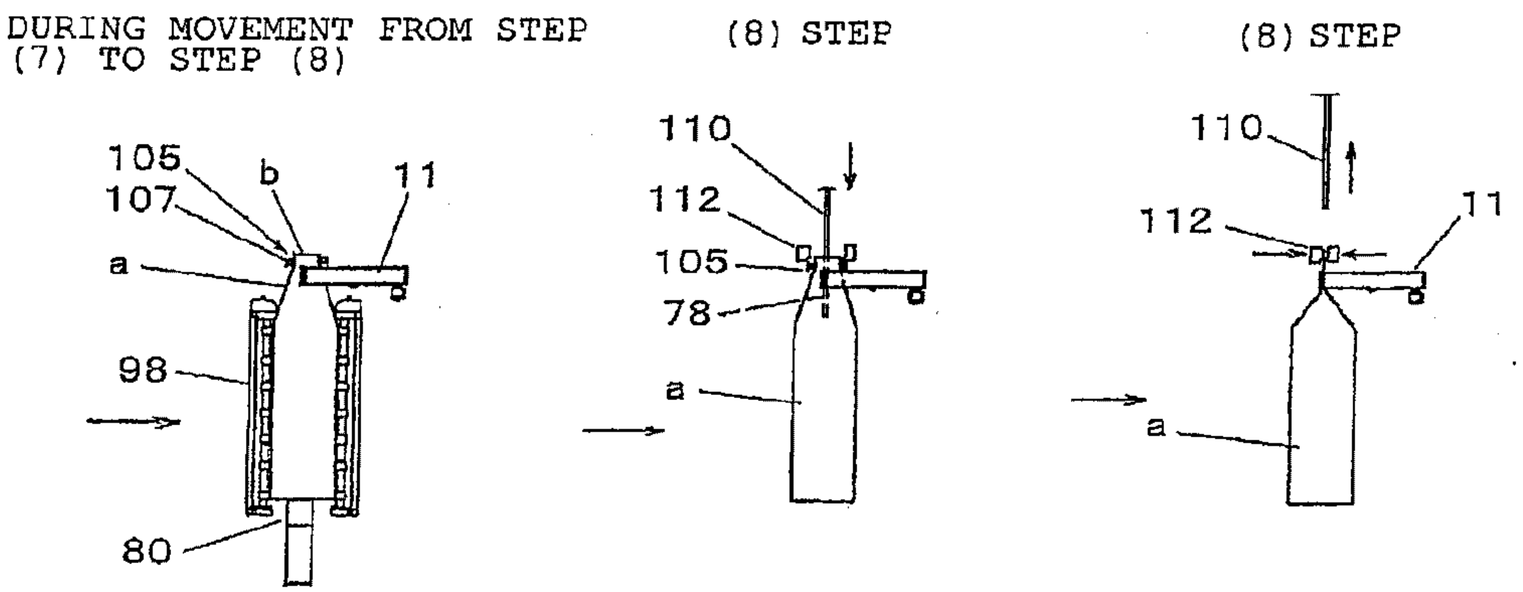
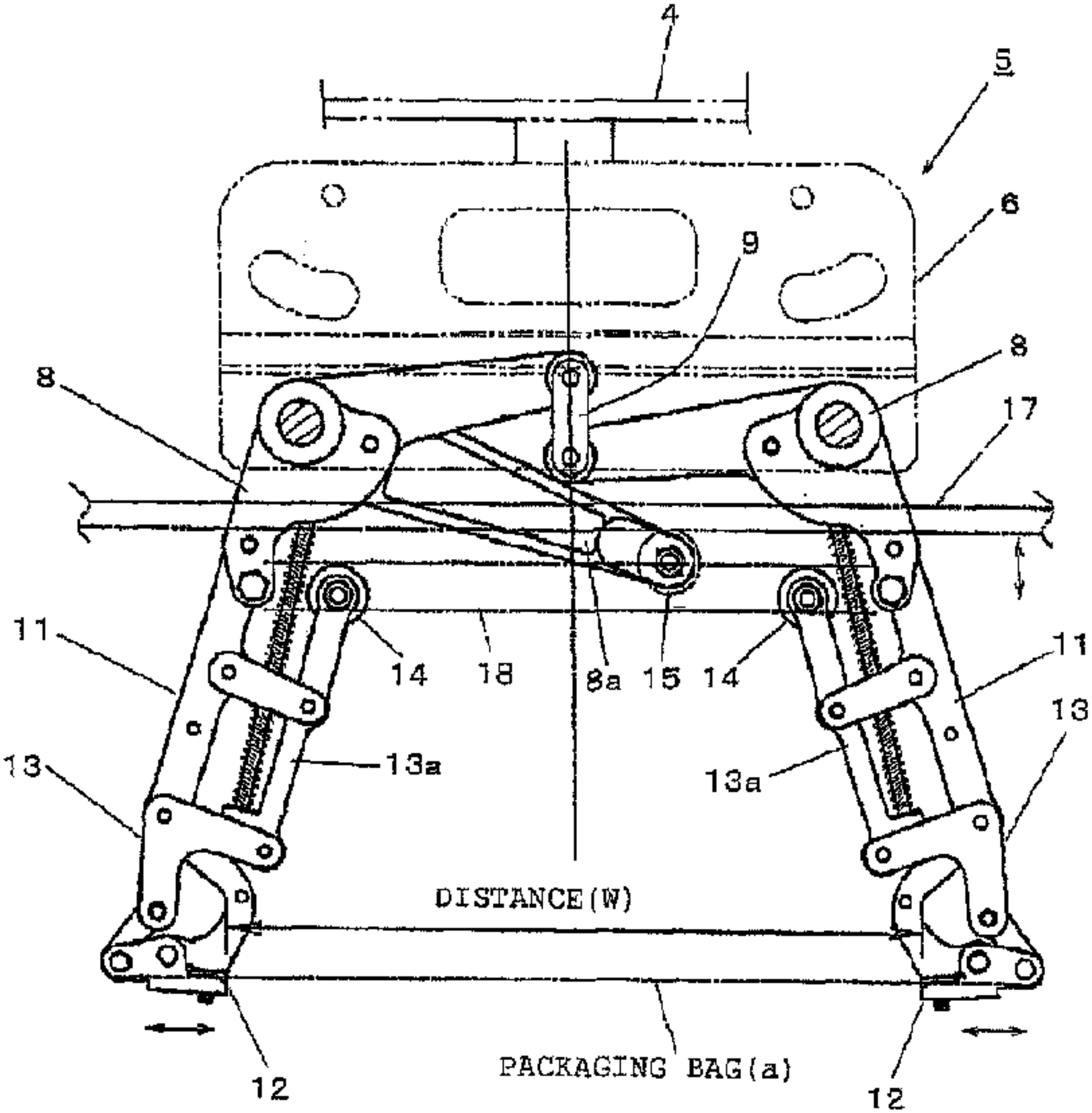

1
95
92
93
96
92
93
94
100
91
99
98
99
(X)
98
99
92
93
96
93
94
100
92
95
99

FIG.14


DURING MOVEMENT FROM STEP (7) TO STEP (8)
77
78
107
a
91
98
98
105
106
108
107
108
b
a
11
11
108
108
107
DETAIL OF ENCIRCLED PART


DURING MOVEMENT FROM STEP (7) TO STEP (8)
105
107
b
11
a
98
80
(8) STEP
110
112
105
78
a
(8) STEP
110
112
11
a


4
5
6
9
8
8
17
11
14
18
8a
15
14
11
13
13a
13a
13
DISTANCE(W)
12
PACKAGING BAG(a)
12