(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 March 2009 (26.03.2009)

PCT

(10) International Publication Number
WO 2009/038245 A1

(51) International Patent Classification:
B65G 47/74 (2006.01) *B29C 49/00* (2006.01)

(21) International Application Number:
PCT/KR2007/005110

(22) International Filing Date: 18 October 2007 (18.10.2007)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2007-0096844
21 September 2007 (21.09.2007) KR

(71) Applicant *(for all designated States except US)*: **IMG PLASTECH CO., LTD.** [KR/KR]; C-1101 Woolim-Lions Valley, 425, Cheongchun-dong, Boopyung-gu, Incheon 403-030 (KR).

(71) Applicants and
(72) Inventors: **SONG, Young-Guk** [KR/KR]; 103-103 Poonglim Apt., 214 Gajwa-dong, Seo-gu, Incheon 404-250 (KR). **CHANG, Tzu Chiang**; No. 8, Taiping 23st, Taiping City Taichung, 41144 (TW).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **LEE, Wan Chul** [KR/KR]; 510-101 Jugong Apt., Bugae3-dong, Bupyeong-gu, Incheon 403-731 (KR).

(74) Agent: **C & S LOGOS PATENT AND LAW OFFICE**; 13th Floor, Seocho-Pyunghwa Building, 1451-34 Seocho-dong, Seocho-gu, Seoul 137-070 (KR).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

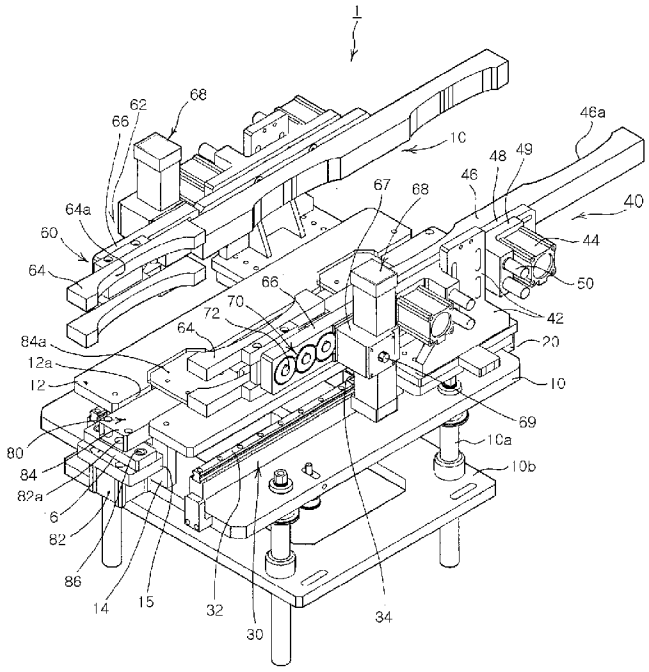
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,

[Continued on next page]

WO 2009/038245 A1

(54) Title: WORKPIECE TRANSFER DEVICE, AND APPARATUS AND METHOD FOR PRODUCING MOLDED CONTAINER USING THE SAME

[Fig. 4]



(57) Abstract: There are provided a workpiece transfer device for rotationally transferring a workpiece, particularly a molded container such as a plastic container, and an apparatus and method for producing a molded container using the same. The workpiece transfer device includes a movable member provided to move along a transfer path of a workpiece; and one or both of a workpiece holder unit and a rotational workpiece holder unit, the workpiece holder unit being arranged over the movable member to hold a workpiece in a position where the workpiece holder units face each other, and the rotational workpiece holder unit being rotationally mounted in one side of the workpiece holder unit over the movable member while holding the workpiece, and being linked with the workpiece holder unit in a position where the rotational workpiece holder units face each other. In addition, the apparatus and method for producing a molded container are configured to include the workpiece transfer device, or produce a molded container using the workpiece transfer device. The workpiece transfer device may be useful to adjust a position of a container inlet in accordance with the production process in the production of a molded container by realizing the rotation and transfer of a container, and thus improve productivity through automated production of the container, as well as reducing the production cost.

PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

Description

WORKPIECE TRANSFER DEVICE, AND APPARATUS AND METHOD FOR PRODUCING MOLDED CONTAINER USING THE SAME

Technical Field

[1] The present invention relates to a workpiece transfer device, and an apparatus and method for producing a molded container using the same, and more particularly, to a workpiece transfer device capable of adjusting a position of a container inlet in accordance with the production process in the production of a workpiece, particularly a synthetic resin (plastic) molded container having an inlet by realizing the rotation and transfer of a container, and an apparatus and method for producing a molded container using the same capable of improving productivity through automated production of the container, as well as reducing the production cost.

Background Art

[2] Molded containers such as a synthetic resin container (e.g., including a plastic container) are produced by molding a parison in a mold while expanding the parison which is a molten pre-formed product supplied by the extrusion of resin materials.

[3] Such a molded container is produced in a cylindrical or regular hexahedral shape to store liquids, for example oil, and it generally has an inlet that is opened and shut with a stopper.

[4] Meanwhile, FIGS. 1 and 2 show a conventional molding machine 200 for forming a molded container such as a plastic container.

[5] However, FIG. 1 shows a molding machine for producing a container 100a whose inlet is arranged in the top thereof, and FIG. 2 shows a molding machine for producing a container 100b whose inlet is arranged in the bottom thereof.

[6] Hereinafter, a reference numeral '100a' represents a molded container having a container inlet arranged in the top thereof, and a reference numeral '100b' represents a molded container having a container inlet arranged in the bottom thereof.

[7] As shown in FIGS. 1 and 2, the molding machine 200 includes an extruder 210 for extruding a synthetic resin material into a hollow form to supply a parison 110 as a molten pre-formed product; a mold unit 220 including molds 222 and 224 for molding the parison 110; a carrier 230 for transferring the mold unit; and a scrap processing unit 240 including upper/lower punching members 242 and 244 for processing scraps of the molded container.

[8] However, the molding machine 200 of FIG. 1 further includes a carrier 250 including a blowing pin 252 for injecting air through an inlet of the container molded in the mold

unit 220, the air being used to cool the container, since the container is produced with a container inlet being arranged in the top of the container.

[9] On the contrary, the molding machine 200 of FIG. 2 further includes the mold carrier 230 including a blowing pin 232 and an expanding pin 234; and a scrap holder unit 250' for transferring the molded container 100b from the mold unit to the scrap processing unit 240, the molded container 100b having an inlet arranged in the bottom thereof.

[10] However, the known molding machines 200 as shown in FIGS. 1 and 2 have the following problems regarding the production of the molded container.

[11] For example, since the molded container 100a is produced with an inlet being arranged in the top of the molded container 100a in the case of the molding machine as shown in FIG. 1, the mold unit 220 has a movable width (stroke) that is longer than that of the mold unit in the molding machine as shown in FIG. 2 due to the interference between a frame 212 of the extruder 210 and the carrier 250 including a blowing pin 252.

[12] Therefore, an additional space is required for installation of the molding machine, which leads to the increase in the production cost of the molding machine.

[13] For the molding machine of FIG. 1, the extruder 210 should further include a sealing cutter 214 for molding a container inlet precisely since the air is injected into the container by forcing a blowing pin 252 to move down through a container inlet that is formed after the molding of the parison 110 using a mold.

[14] Particularly, when the mold unit 220 moves to the parison 110 by means of the carrier 230, left and right molds 222 and 224 of the mold unit 220 are closed, and the mold unit 220 returns to an initial position, as shown in FIG. 1, the blowing pin 252 moves down, and the container is then cooled with the air passed through its own inlet. Therefore, the mold unit slowly moves from a parison position to a blowing position to secure the complete molding of the container inlet, which leads to the delay in the production time.

[15] Furthermore, when the left and right molds 222 and 224 of the mold unit 220 are closed as shown in FIG. 1, an upper portion of the parison 110 is first in contact with the molds, resulting in the poor molding of the container inlet.

[16] For example, the molding machine of FIG. 1 does not have a space in which the blowing pin 232 and the expanding pin 234 are installed, the characteristic of which is different from that of the molding machine as shown in FIG. 2 (since a container inlet is arranged in the top of the container, it is impossible to operate a blowing pin and an expanding pin and to employ a lower space of the parison).

[17] Therefore, the molding machine of FIG. 1 has problems that the molding in the contact point of the parison 110 may be easily poor in the molding of a container since

it is impossible to narrow the initial gap 'H1' of the molds as shown in FIG. 1 to an initial gap 'H2' of the molds as shown in FIG. 2 while expanding the parison 110 using the blowing pin 232 and the expanding pin 234 that move toward the carrier 230 as in the molding machine of FIG. 2.

[18] However, since the container is produced with a container inlet being arranged in the top of the container in the case of the molding machine of FIG. 1, the molding machine of FIG. 1 is advantageous for the molding machine of FIG. 2 in which a molded container 100b is being molded, with an inlet being arranged in the bottom of the container 100b, by performing a finishing process such as inspection, transfer or package of the container after the molding of the container.

[19] Meanwhile, the molding machine as shown in FIG. 2 has solutions to the various problems regarding the molding machine of FIG. 1 in that it is possible to arrange the blowing pin 232 and the expanding pin 234 in the carrier 230 arranged below the container, and to use a lower space of the parison since the container inlet is arranged in the bottom of the container 100b.

[20] For example, the molding machine of FIG. 2 is advantageous to reduce the total production time of the container, compared to the molding machine of FIG. 1, since the air passed through the inlet quickly flows through the blowing pin, which is formed integrally with a mold carrier, even when the molds are closed during a molding process of the parison 110.

[21] Also, the quick cooling of the container makes it possible to reduce the poor molding of the container, for example cracks caused in the contact points of the parison 110 in the molding of the container.

[22] However, the container is produced with the inlet being arranged in the bottom of the container in the case of the molding machine as shown in FIG. 2, and therefore the molding machine has a disadvantage that, in order to inspect a container (particularly, inspect a container inlet and a handle that may be frequently poorly molded), and to transfer and pack a container when the molding of the container is completed as described above, workers should troublesomely catch containers and turn around the container one by one so that an inlet can be positioned upwardly in the container.

[23] These problems make it impossible to automatically produce the molded container.

[24] As a result, it is possible to make the automatic production of a molded container using the conventional molding machine 200 by producing a molded container 100b whose inlet is arranged downwardly using the molding machine as shown in FIG. 2, followed by automatically turning and transferring the container so that an inlet of the container can be arranged upwardly so at to facilitate the inspection, transfer and package of the container.

Disclosure of Invention

Technical Problem

[25] The present invention is designed to solve the problems of the prior art, and therefore it is an object of the present invention to provide a workpiece transfer device capable of adjusting a position of a container inlet in accordance with the production process in the production of a workpiece, particularly a synthetic resin (plastic) molded container having an inlet by realizing the rotation and transfer of a container.

[26] It is another object of the present invention to provide an apparatus and method for producing a molded container using the workpiece transfer device capable of improving productivity through automated production of the container, as well as reducing the production cost.

Technical Solution

[27] According to one technical aspect of the present invention, there is provided a workpiece transfer device including a movable member provided to move along a transfer path of a workpiece; and one or both of a workpiece holder unit and a rotational workpiece holder unit, the workpiece holder unit being arranged over the movable member to hold a workpiece in a position where the workpiece holder units face each other, and the rotational workpiece holder unit being linked with the workpiece holder unit in a position where the rotational workpiece holder units face each other and provided to turn around the workpiece in one side of the workpiece holder unit over the movable member while holding the workpiece.

[28] According to another technical aspect of the present invention, there is provided an apparatus for producing a molded container using a workpiece transfer device, the apparatus including an extruder for extruding raw materials to supply a parison; a mold unit movably provided as a carrier in one side of the extruder; a scrap holder unit for holding a scrap of the molded container and transferring the scrap to one side of the mold unit; and a workpiece transfer device as defined in any one of claims 1 to 13, which is installed in one side of the scrap processing unit to transfer the molded container while rotating the molded container.

[29] According to still another technical aspect of the present invention, there is provided a method for producing a molded container using a workpiece transfer device, the method including: supplying a parison; molding the parison into a molded container in a mold so that a container inlet is arranged in the bottom thereof; and rotationally transferring the molded container so that the container inlet is arranged upwardly in the container whose inlet is arranged in the bottom thereof when the molding of the container is completed, by using the workpiece transfer device.

Advantageous Effects

[30] As described above, the workpiece transfer device according to the present invention may be useful to adjust the optimum position of a container and transfer the container in accordance with the production process by realizing the rotation and transfer of a container in the production of a workpiece, particularly a molded container such as plastic container having an inlet, and thus automatically produce the container.

[31] As a result, the apparatus and method for producing a molded container using the workpiece transfer device may be also useful to improve the productivity of the molded container, as well as to improve the production quality through the stable molding process and reduce the production cost of the container.

Brief Description of the Drawings

[32] FIG. 1 is a configuration view illustrating a conventional molding machine.

[33] FIG. 2 is a configuration view illustrating another conventional molding machine.

[34] FIG. 3 is a combined configuration view illustrating an apparatus for producing a molded container including a workpiece transfer device according to one exemplary embodiment of the present invention and a molding machine as shown in FIG. 2.

[35] FIG. 4 is a perspective view illustrating the workpiece transfer device according to one exemplary embodiment of the present invention as shown in FIG. 3.

[36] FIG. 5 is a front view illustrating the workpiece transfer device according to one exemplary embodiment of the present invention as shown in FIG. 4.

[37] FIG. 6 is a side configuration view illustrating the workpiece transfer device according to one exemplary embodiment of the present invention.

[38] FIG. 7 is an operation flowchart illustrating an elevating unit of the workpiece transfer device according to one exemplary embodiment of the present invention.

[39] FIG. 8 is a plane view illustrating holder units of the workpiece transfer device according to one exemplary embodiment of the present invention.

[40] FIG. 9 is a front view of FIG. 8.

[41] FIG. 10 is an operation flowchart illustrating a rotational holder arm and its operation in a rotational holder unit of the workpiece transfer device according to one exemplary embodiment of the present invention.

[42] FIG. 11 is a plane configuration view illustrating a rotational drive system according to one modified embodiment of the present invention as shown in FIGS. 8 and 10.

[43] FIG. 12 is a schematic view illustrating a modified vertical support in the use of the rotational drive system as shown in FIG. 11.

[44] FIGS. 13 and 14 are configuration views illustrating an operation of producing a molded container in the apparatus for producing a molded container using the workpiece transfer device according to one exemplary embodiment of the present invention.

Best Mode for Carrying Out the Invention

[45] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[46] FIG. 3 shows an apparatus for producing a molded container according to the present invention including a workpiece transfer device 1 according to one exemplary embodiment of the present invention and a molding machine 200 as shown in FIG. 2.

[47] Hereinafter, the workpiece transfer device 1 according to the present invention will be described as a 'molded container transfer device' since a workpiece is limited to a molded container, and the apparatus and method for producing a molded container using the workpiece transfer device according to the present invention will be then described with reference to FIGS. 3, 13 and 14.

[48] And, the molding machine 200 as shown in FIGS. 1 and 2 and its related units are presented by reference numerals of two hundreds, and the molded container is divided into two groups: '100a': a container whose inlet is arranged in the top thereof, and '100b': a container whose inlet is arranged in the bottom thereof.

[49] However, it is considered that the molded container transfer device according to the present invention does neither necessarily apply to the molding machine, nor is restrictively used to produce a molded container.

[50] For example, when a workpiece has a small weight and a predetermined volume, the workpiece is applicable to the workpiece transfer device 1 according to the present invention without any difficulty.

[51] First, the molded container transfer device 1 according to the present invention is arranged to move from the molding machine 200 to one side of the mold unit 220 along a transfer path of a workpiece, for example a molded container, whose scrap is removed from a scrap processing unit 240, as shown in FIG. 3.

[52] Also, a container cooling unit 260 may be further arranged over the molded container transfer device 1 according to the present invention as shown in FIG. 3, wherein the container cooling unit 260 further cools a container by rotating a container 100b whose inlet is arranged in the top thereof by using a transfer device, followed by injecting air into the container through the inlet of the molded container 100a that is arranged upwardly, as described later in detail.

[53] In this case, the container cooling unit 260 includes a plurality of blowing nozzles 264 provided in an elevating plate (not shown) to inject the air through the container inlet, the elevating plate being elevated by means of a cylinder 262 provided in a body of the container cooling unit 260.

[54] Of course, it is evident to those skilled in the art that the position (gaps) of the blowing nozzles 264 is matched to positions of the molded containers 100a.

[55] However, such a container cooling unit 260 may be used in the molded container transfer device 1 according to the present invention since the molded container transfer device 1 may turn around the container.

[56] Therefore, the molded container transfer device 1 according to the present invention may be used to automate a series of operations of producing a molded container including supplying a parison 110 using an extruder 210, molding a container in a mold, removing scraps using a scrap processing unit, and rotating and transferring a container whose inlet is changed in its position.

[57] That is to say, the problems caused in the use of the molding machine of FIG. 1 are solved using the molding machine of FIG. 2 as described above, and therefore it is possible to secure the optimum process for producing a molded container according to the present invention by adjusting an inlet of the molded container to face upward, which makes it easy to inspect, transfer and pack a container.

[58] Meanwhile, the molded container transfer devices 1 according to the present invention are shown in detail in FIGS. 4 to 12, respectively.

[59] First, FIGS. 4 and 5 are a perspective view and a front view showing the entire configurations of the molded container transfer device 1 according to the present invention, respectively.

[60] That is to say, the molded container transfer device 1 according to the present invention mainly includes a movable member 20 provided to move along a transfer path of a molded container 100b that is a workpiece; and one or both of a workpiece (for example molded container) holder unit 40 and a rotational workpiece holder unit 60, the workpiece holder unit 40 being arranged over the movable member 20 to hold a container in a position where the workpiece holder units face each other, and the rotational workpiece holder unit being linked with the workpiece holder unit in a position where the rotational workpiece holder units face each other and provided to rotationally transfer the container in one side of the workpiece holder unit 40 over the movable member 20 while holding the molded container.

[61] However, the molded container transfer device 1 according to the present invention will be described in detail, including the holder unit 40 and the rotational holder unit 60.

[62] For the molded container transfer device 1 according to the present invention, the holder unit 40 functions to transfer molded containers 100a and 100b, and the rotational holder unit 60 functions to turn around the molded container 100b whose inlet is positioned in the bottom thereof, wherein scraps are removed from the inlet by the scrap processing unit 240 (see FIG. 3), and finally to extract the molded container 100a whose inlet is positioned in the top thereof.

[63] That is to say, in the molded container transfer device 1 according to the present

invention, the rotational holder unit 60 is produced so that the molding machine of FIG. 2 can operate during the molding process, and therefore functions to facilitate the inspection, transfer and package of the container, and to turn around the container so as to position an inlet in the top of the container when the molding process is completed.

[64] Next, in the molded container transfer device 1 according to the present invention, the movable member 20 includes a horizontally moving plate that moves horizontally through a movement unit 30 provided over a base plate 10 that is arranged on a movement path of the molded container, as shown in FIGS. 4 and 5.

[65] In this case, the base plate 10 is arranged to adjust a height in one side of a facility frame of the molding machine 200 as shown in FIGS. 3 and 4, for example fixed onto support rods 10a that are vertically fixed in four sides of a lower base plate 10b that is horizontally adjusted and fixed in the facility frame of the molding machine.

[66] Meanwhile, the movement unit 30 for moving a movable plate which is the horizontally movable member 20 includes a rail member 32 such as an LM guide installed in both upper sides of the base plate 10; a movable block 34 such as an LM block placed on the rail member 32 to move along the rail member 32 and fixed in the bottom of the horizontally moving plate; and a drive system, for example a rodless cylinder 36, arranged on the base plate while being liked with the horizontally movable member 20, as shown in FIGS 4 and 5.

[67] Therefore, when the known rodless cylinder 36 operates as shown in FIGS. 5 and 6, the horizontally moving plate as the horizontally movable member 20 coupled to the known rodless cylinder 36 moves along a rail member as much as the length of the base plate to correspond to the movement path of the molded container while a movement level of the horizontally movable member 20 is adjusted.

[68] In this case, a configuration of the rodless cylinder 36 is schematically shown in FIG. 6 as one example of the drive system. Here, a plurality of movable arms 36c in which a body 36a of the rodless cylinder 36 are flowably assembled are fixed between fixing shafts 14 (see FIG. 4) vertically installed in both sides of the base plate 10, and a coupling block 36b coupled to the cylinder body 36a is fit and fixed in a placement portion 20a formed in the center of the horizontally moving plate.

[69] Therefore, when the body 36a of the rodless cylinder moves along the movable arm 36c, the movable blocks 34 formed in both lower sides of the horizontally moving plate move along the rail member 32, and therefore realizing a reciprocating motion of the horizontally moving plate which is the horizontally movable member 20.

[70] However, the rodless cylinder 36 has been described in detail as one example of the drive system in this exemplary embodiment, but it is possible to use other types of drive systems, for example a drive system including a ball screw and a movable block coupled to the ball screw.

[71] Next, the molded container transfer device 1 according to the present invention further includes a molded container elevating unit 80 for elevating the molded container 100a whose inlet is position in the top thereof by turning around the workpiece, for example a molded container upwardly to the horizontally movable member 20, as shown in FIGS. 4, 5 and 7.

[72] In this case, the molded container elevating unit 80 includes vertical drive cylinders 82 arranged in both sides of the base plate 10; and a molded container elevating shaft 84 extended as much as at least a length of the base plate 10 and arranged on the horizontally movable member 20 to elevate the molded container, wherein the vertical drive cylinders 82 are coupled to both ends of the molded container elevating shaft 84.

[73] And, the molded container elevating shaft 84 is arranged inside an opening 12a of the molded container placement plate 12 fixatively arranged on the base plate 10 (in fact, two placement plates are arranged between the fixing shafts 14), as shown in FIGS. 4 and 5.

[74] Also, in the both sides of the base plate 10, a support plate 15 is fixed in the fixing shafts 14 fixing the placement plate 12, and a guide plate 16 is installed onto the support plate 15.

[75] Furthermore, a rod 82a of the vertical drive cylinder 82 is coupled to a shaft 84 through the guide plate 16. In this case, a guide pole 86 provided in the support plate 15 is inserted into a hole (not shown) of the guide plate 16.

[76] Therefore, the molded containers 100b whose inlet is positioned in the bottom thereof, which is held in holder arms 46 and 64 of the workpiece (molded container) holder unit 40 and the rotational workpiece holder unit 60, are sequentially rotated, and simultaneously transferred to a position wherein the container is discharged with an inlet being positioned in the top of the container as shown in FIG. 14 (V in a transfer conveyor as shown in FIG. 14), as shown in FIGS. 5 and 7.

[77] Therefore, the containers are sequentially arranged on the placement plate 12 fixatively arranged on the base plate 10.

[78] In this case, the molded container 100a, which is turned to position the container inlet placed on the placement plate 12, acts as an elevating shaft 84 that is integrally elevated with the operation of the vertical drive cylinder 82, and moves up as much as a gap 'h' as shown in FIGS. 5 and 7.

[79] In this context, when the elevating shaft 84 moves down by means of the operation of the vertical drive cylinder 82 while the container is held in the holder arms of the holder units, a gap 'h' is formed between a lower surface of the molded container and the placement plate 12.

[80] Therefore, the molded containers held in the holder units are spaced apart from the placement plate 12 even when the horizontally moving plate that is the horizontally

movable member 20 moves horizontally without any change in the gap of the horizontally moving plate. Therefore, the molded containers are transferred without any friction with the placement plate.

[81] Meanwhile, a molded container backing plate 84a is further provided in an upper portion of the elevating shaft 84, the molded container backing plate 84a having a wider area than the elevating shafts that supports the molded container placed on the placement plate, as shown in FIG. 4.

[82] Such a backing plate 84a may support the molded container more stably.

[83] As a result, the elevating unit 80 functions to prevent a friction between the placement plate and the lower surface of the container being transferred in the transfer device according to the present invention.

[84] Next, the holder units 40 and 60 that rotate and transfer the molded containers in the molded container transfer device 1 according to the present invention will be in fact described in detail.

[85] Such holder units 40 and 60 are shown in detail as shown in FIGS. 4, 5, 8 and 9.

[86] First, the molded container holder unit 40 in the transfer device according to the present invention includes a fixing shaft 49 fixatively installed in the vertical supports 42 that are fixed in both sides of the movable plate that is the horizontally movable member 20; at least one horizontal drive cylinder 44 horizontally installed in the rear of the fixing shaft; and a holder arm 46 coupled to the front of the horizontal drive cylinder 44 to hold a molded container that is the workpiece, as shown in FIGS. 4, 5 and 8.

[87] In this case, at least one contact groove 46a for a molded container is formed in the holder arm 46, the contact groove 46a being concavely processed to match the size of the molded container, as shown in FIGS. 4 and 8

[88] Therefore, when the horizontal drive cylinders 44, which are coupled to both sides of the fixing shaft 49 fixed in the vertical supports 42 that moves together with the horizontally moving plate that is the horizontally movable member 20, move forward as described above, the molded container 100a is transferred while being held between the contact grooves 46a of both holder arms 46, as shown in FIG. 8.

[89] Of course, when the horizontal drive cylinder 44 moves backward, the container is separated from the holder arm, and then put on the backing plate 84a.

[90] Also, a fixing plate 48 to which a rod 44a of the horizontal drive cylinder 44 is coupled is fixed in the rear of the holder arm 46, and a guide pole 50 for supporting the fixing shaft 49 is installed in the rear of the fixing plate 48, as shown in FIGS. 4 and 8.

[91] Therefore, when the horizontal drive cylinder 44 moves forwards or backwards, the guide pole 50 is passed through the fixing shaft 49, thereby supporting the fixing shaft 49. Accordingly, the guide pole 50 stably maintains the movement of the container

when the holder arm 46 holds the container.

[92] Next, for the workpiece (molded container) transfer device 1 according to the present invention, the rotational workpiece holder unit 60, which adjusts a position of the molded container 100a so that an inlet of the molded container 100a can be positioned upwards by inversely turning the molded container 100b whose inlet is positioned downwards, includes a rotational drive system 62 linked in one side of the holder unit 40 provided onto the horizontally movable member 20; and a rotational holder arm 64 linked with the rotational drive system 62 and provided to rotate a molded container while holding the molded container in the same line as the holder unit 40, as shown in FIGS. 4, 5 8 and 9.

[93] That is to say, unlike the above-mentioned holder unit 40, the rotational holder unit 60 according to the present invention is characterized in that it can rotate the molded container, using the separately installed rotational drive system 62, while holding the molded container.

[94] In this case, FIGS. 8 to 10 show the rotational drive system 62 as shown in FIG. 4. Here, the rotational drive system 62 includes a gear block 66 coupled to one side of the holder arm 46 provided in the holder unit 40; a rotary actuator 68 installed to be linked with the gear block 66, and a rotation axis 72 provided in one of a plurality of gears arranged to control each other in the gear block 66 while being linked with the rotary actuator, wherein the rotational holder arm is coupled to the rotation axis 72.

[95] A concave gear placement portion 66a in which gears are assembled as shown in FIG. 10 may be formed in the gear block 66.

[96] As shown in FIG. 10, when the actuator 68 operates, a plurality of the gears that are installed in the gear block 66 linked with the actuator 68 are also rotated. Therefore, the rotation axis 72 provided in one gear (e.g., the last gear) of a plurality of the gears is rotated as much as a predetermined rotation angel, and therefore a double-structure rotational holder arm 64 fixed in a rotation plate 71 to which the rotation axis 72 is coupled is rotated while holding a molded container during the operation of the horizontal drive cylinder 44 of the vertical support 42.

[97] Therefore, the molded container 100b having an inlet positioned in the bottom thereof is rotated while being held in the holder arm 64 of the rotational holder unit 60, thereby adjusting a position of the molded container 100a so that an inlet of the molded container 100a can be positioned upwards, as shown in FIGS. 10 and 13.

[98] In this case, the gear block 66 is fixed in an end of the holder arm 64 of the holder unit 40 by means of bolts, and therefore when the horizontal drive cylinder 44 of the vertical support moves forwards, the holder arm 46 of the holder unit 40, the rotational drive system 62 of the rotational holder unit 60 and the rotational holder arm 64 coupled to the rotation axis 72 integrally move forwards, and hold a molded container,

as shown in FIG. 8.

[99] Therefore, the holder arms of the holder unit according to the present invention may be used to transfer up to 3 containers and rotate one container.

[100] Of course, it is possible to adjust a length of the holder arm so as to adjust the holding number and rotation number of a container.

[101] In this case, the rotary actuator 68 of the rotational drive system 62 includes racks 68a that are driven up and down by air supplied to a rotary actuator; and a pinion gear 68b controlled by the racks 68a, as shown in FIGS. 10 and 11.

[102] Also, the gears rotationally assembled to the gear block 66 in sequence includes a drive gear 70a arranged in one side of the gear block 66 while being fixed in a drive axis 69 of the actuator pinion gear 68b; at least one driven gear 70b and 70c arranged in the gear block 66 while being engaged with the drive gear 70a; and a rotation gear 70d arranged in the gear block to be engaged with the last driven gear.

[103] And, the rotation axis 72 to which the rotational holder arm 64 is coupled is provided in the rotation gear 70d, as described above.

[104] Therefore, when the drive axis 69 rotates together with the pinion gear during the operation of the racks in the rotary actuator, a drive gear 70a rotates, and driven gears 70b and 70c engaged with the drive gear 70a are rotated, and the rotation gear is finally rotated integrally with a rotation axis, and therefore one cycle of the rotational holder arm 64 is completed, as shown in FIGS. 9 and 10.

[105] Meanwhile, the pinion gear 68b and the drive axis 69 is arranged inside the case 67 coupled to the actuator 68, as shown in FIGS. 4 and 5.

[106] In this case, contact grooves 64a for a container are formed in the holder arm, as shown in FIG. 8.

[107] Meanwhile, a rotation force is intactly delivered to axes and gears since the rotation gears to which the rotation axis 69 and the rotation axis 72 of the drive gears are coupled are assembled with keys, and the driven gears 70b and 70c may be assembled into convex grooves of the gear block using pins, so that the driven gears 70b and 70c can operate idly, as shown in FIGS. 4, 8 and 10.

[108] In this case, because one side end of the holder arm 46 of the holder unit 40 is fixed in the gear block 66 of the rotational holder unit 60, two holder arms 46 and 64 pass by a container with the container being arranged between the holder arms 46 and 64, and hold the container during the above-mentioned forward and backward operations of the horizontal drive cylinder 44, as shown in FIGS. 4 and 8.

[109] Next, FIG. 11 shows a modified rotational drive system 62' in which a rotation center of the rotational holder arm is adjusted from C1 to C2.

[110] For example, the rotation gear of the rotational drive system may be present in plural numbers 70d to 70e, wherein the rotation gears are flowably coupled to a rotation axis

72' in the gear block 66 and the rotational holder arm 46 is coupled to the rotation axis 72'

[111] Therefore, because the rotation center is adjusted from C1 to C2, and thus the molded container may be increased in size to (D2-D1)×2, the transfer device according to the present invention may operate easily even when the container is increased in size, as shown in FIG. 11.

[112] In this case, a rotation axis 72' including a new drive gear 70e is further extended from the gear block 66 since the rotation axis 72' is adjusted from a position where the drive gear 70e is not engaged with the rotation gear 70d to a position where the drive gear 70e is engaged with the rotation gear 70d, and a hole 72'b into a fixing pin 72'a is inserted is formed to prevent the deviation of the rotation axis from the gear block, as shown in FIG. 11.

[113] And, the rotation plate 71 into which the holder arm 46 is disassembled/assembled with bolts is necessarily assembled with screws (S) so that the rotation plate 71 can be assembled to the rotation axis 72'

[114] Meanwhile, because a rotation path of the holder arm is extended from P1 up to P2 when the rotation center is changed from C1 to C2, it is necessary to install a vertical support 42' in the horizontally movable member 20 so as to compensate for the extension, wherein long hose of the vertical support 42' are lengthened and its height is adjusted to a predetermined level, as shown in FIG. 12.

[115] Next, FIGS. 3, 13 and 14 show an apparatus for producing a molded container including the known molding machine 200 as shown in FIG. 2 and the molded container transfer device, for example the workpiece transfer device 1, according to the present invention as described above up to now.

[116] Therefore, operations of producing a molded container using the molded container transfer device 1 of the present invention and the molding machine 200 will be described in detail, as follows.

[117] For example, the operations of producing a molded container using the workpiece (molded container) transfer device 1 according to the present invention includes: supplying a molten pre-formed product parison 110 by means an extruder 210; molding into a molded container 100b the parison 110 supplied into left and right molds 222 and 224 of a mold unit 220 while an inlet of the container is positioned downwards; and finally transferring the molded container to a conveyor(V) which is a position where a container is discharged as shown in FIG. 14 while rotating the container whose inlet is arranged in the bottom thereof so that the container inlet is arranged upwardly in the container when the molding of the container is completed, by using the workpiece transfer device as described above.

[118] Therefore, the operations of producing a molded container according to the present

invention solved the problems caused when the molded container 100a whose inlet is positioned in the top thereof is produced as shown in FIG. 1, by forming a parison into a molded container 100b whose inlet is positioned in the bottom thereof as shown in FIG. 2.

[119] Next, scraps are removed from the scrap processing unit 240. Then, in order to facilitate several subsequent processes of the product, the container is rotated using the transfer device, and discharged with an inlet of the container being positioned upwards. As a result, it is possible to automate a series of the operations of producing a conta iner, as described above.

[120] That is to say, referring to FIGS. 3, 13 and 14, when a carrier 230 of the molding machine 200 moves right under the supplied parison 110 of the extruder 210, a blowing pin 232 and an expanding pin 234 of the carrier 230 tightly pull the parison 110 (see FIG. 2). Then, when left and right molds 222 and 224 of the mold unit 220 (see FIG. 2) are pressed with each other, the blowing pin 232 starts blowing when the blowing pin 232 matches a downward positioned inlet of the container 100b, and operates to precisely mold a container while expanding a parison to the maximum extent, and cool the container with blowing air.

[121] Next, when the carrier 230 returns to an initial position, for example a position right under a scrap holder unit 250' and molds of the mold unit are opened, the scrap holder unit 250' moves down to hold a container scrap and transfers the container 100b whose inlet is positioned downwards to the scrap processing unit 240. In this case, upper and lower scraps of the container are removed as upper/lower punching members 242 and 244 of the scrap processing unit.

[122] And, as the horizontally movable member 20 in the transfer device 1 moves as shown in FIG. 13, the holder arm 64 of the left rotational holder unit 60 holds the first container, and rotates the container so that an inlet of the container can be positioned upwards.

[123] Next, when the next containers are sequentially held in the rotational holder arm 64 and the fixing holder arm 46 as shown in FIG. 14, the containers are finally automatically discharged into a conveyor (V) of FIG. 14 while an inlet of the container is positioned upwards.

[124] Accordingly, the containers may be produced in the automation process without any hand-made process by continuously molding containers in the molding machine 200 and rotating, transferring and discharging the container in a continuous manner in the transfer device 1 according to the present invention.

Industrial Applicability

[125] As described above, the transfer device according to the present invention may be

useful to improve productivity through the automatic production of the molded container and reduce the production cost since a molded container, particularly a plastic container having an inlet, may be transferred while being rotated in a desired direction to arrange a container inlet upwardly or downwardly in the molded container.

[126] Meanwhile, the transfer device according to the present invention may apply to all types of workpieces having a certain volume and a predetermined weight, as well as the molded containers.

[127]

[128] The present invention has been described in detail. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

Claims

[1] A workpiece transfer device, comprising:
a movable member provided to move along a transfer path of a workpiece; and one or both of a workpiece holder unit and a rotational workpiece holder unit, the workpiece holder unit being arranged over the movable member to hold a workpiece in a position where the workpiece holder units face each other, and the rotational workpiece holder unit being linked with the workpiece holder unit in a position where the rotational workpiece holder units face each other and provided to turn around the workpiece in one side of the workpiece holder unit over the movable member while holding the workpiece.

[2] The workpiece transfer device of claim 1, wherein the movable member includes a horizontally moving plate provided to move horizontally by means of a movement unit that is linked over a base plate arranged on a movement path of the workpiece.

[3] The workpiece transfer device of claim 2, wherein the movement unit for translocating the movable member comprises:
a rail member provided in the base plate;
a movable block provided to move along the rail member and fixed in the bottom of the horizontally movable member; and
a drive system arranged over the base plate while being linked with the horizontally movable member.

[4] The workpiece transfer device of claim 1, further comprising a workpiece elevating unit provided to place a workpiece over the movable member and elevate the workpiece.

[5] The workpiece transfer device of claim 4, wherein the workpiece elevating unit comprises:
vertical drive cylinders arranged in both sides of the base plate that is installed so that the movable member can move horizontally; and
a workpiece elevating shaft having the vertical drive cylinders coupled to both ends thereof, and extendedly arranged on the horizontally movable member to elevate the workpiece.

[6] The workpiece transfer device of claim 5, wherein the workpiece elevating shaft is arranged inside an opening portion of the workpiece placement plate fixatively arranged on the base plate, and
wherein the vertical drive cylinder coupled to the elevating shaft is fixed in the vertically fixing shaft that fixes the placement plate in both sides of the base plate.

[7] The workpiece transfer device of claim 5, wherein a workpiece backing plate is further provided over the workpiece elevating shaft.

[8] The workpiece transfer device of claim 1, wherein the workpiece holder unit comprises:
a fixing shaft installed in vertical supports fixed in both upper sides of the movable member;
at least one horizontal drive cylinder horizontally installed in the rear of the fixing shaft; and
a holder arm coupled to the front of the horizontal drive cylinder to hold a workpiece.

[9] The workpiece transfer device of claim 8, wherein a fixing plate to which a rod of the horizontal drive cylinder is coupled is fixed in the rear of the holder arm, and a guide pole that is passed through and supported by the fixing shaft is further provided in the rear of the fixing plate.

[10] The workpiece transfer device of claim 1, wherein the rotational workpiece holder unit comprises:
a rotational drive system linked with one side of the holder unit that is provided over the movable member; and
a rotational holder arm linked with the rotational drive system to hold and turn around a workpiece at the same time.

[11] The workpiece transfer device of claim 10, wherein the rotational drive system comprises:
a gear block coupled to one side of the holder arm provided in the holder unit;
a rotary actuator installed in the gear block; and
a rotation axis provided in one of a plurality of gears arranged to control each other in the gear block while being linked with the rotary actuator, wherein the rotational holder arm is coupled to the rotation axis.

[12] The workpiece transfer device of claim 11, wherein the rotary actuator comprises an air-driven rack and pinion gear controlled by the rack,
wherein the gears rotationally assembled to the gear block in sequence include a drive gear arranged in one side of the gear block while being fixed in a drive axis of the actuator pinion gear, at least one driven gear arranged in the gear block while being engaged with the drive gear, and a rotation gear arranged in the gear block to be engaged with the last driven gear, and
wherein the rotation axis is coupled to the rotation gear.

[13] The workpiece transfer device of claim 12, wherein the rotation gear is present in a plural number, wherein the rotation axis is flowably coupled to the rotation gear in the gear block, and the rotational holder arm is coupled to the rotation

axis to vary a rotation center to correspond to the size of a workpiece.

[14] The workpiece transfer device of any one of claims 1 to 13, wherein the workpiece includes a molded container that is molded in a molding machine, and the device is included as a component of the molding machine and used for an apparatus for producing a molded container.

[15] The workpiece transfer device of claim 14, wherein the device is arranged in one side of a scrap processing unit in the molding machine.

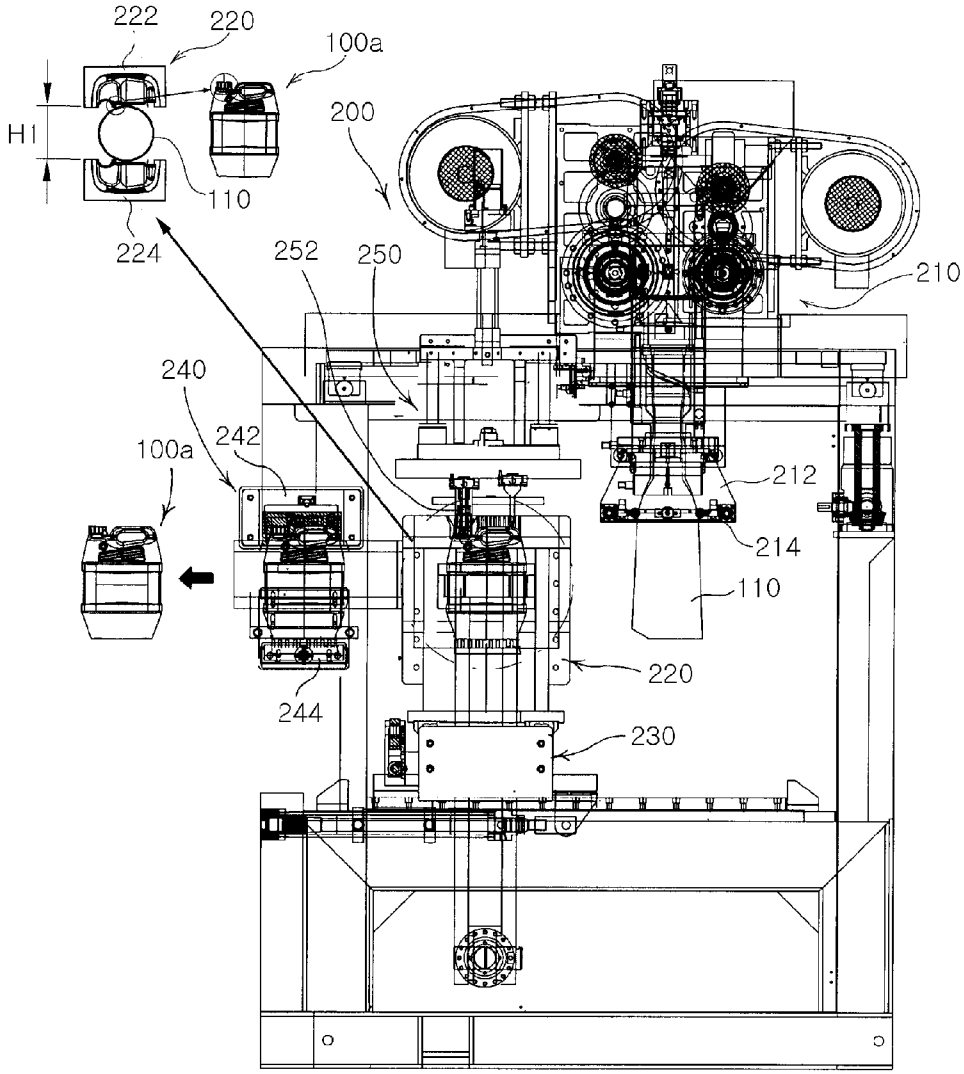
[16] An apparatus for producing a molded container using a workpiece transfer device, the apparatus comprising:
an extruder for extruding raw materials to supply a parison;
a mold unit movably provided as a carrier in one side of the extruder;
a scrap holder unit for holding a scrap of the molded container and transferring the container to one side of the mold unit; and
a workpiece transfer device as defined in any one of claims 1 to 13, which is installed in one side of the scrap processing unit to transfer the molded container while rotating the molded container.

[17] The apparatus of claim 16, further comprising a container cooling unit provided in an upper portion of the workpiece transfer device to cool a container by injecting air through a container inlet.

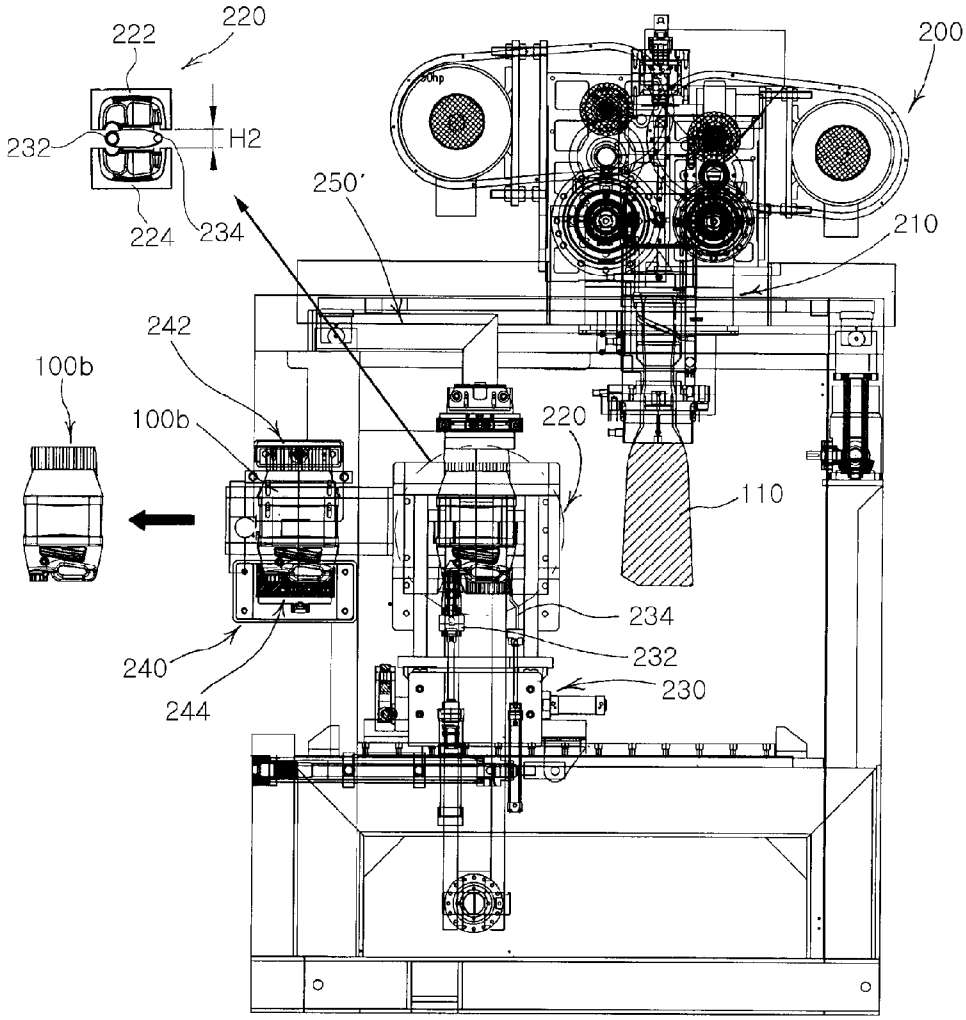
[18] A method for producing a molded container using a workpiece transfer device, the method comprising:
supplying a parison;
molding the parison into a molded container in a mold so that a container inlet is arranged in the bottom thereof; and
rotationally transferring the molded container so that the container inlet is arranged upwardly in the container whose inlet is arranged in the bottom thereof when the molding of the container is completed, by using the workpiece transfer device as defined in any one of claims 1 to 13.

[19] The method of claim 18, wherein the molding of the container comprises:
transferring the molded container to the scrap processing unit by means of the scrap holder unit so as to remove a scrap and processing the molded container by means of the workpiece transfer device.

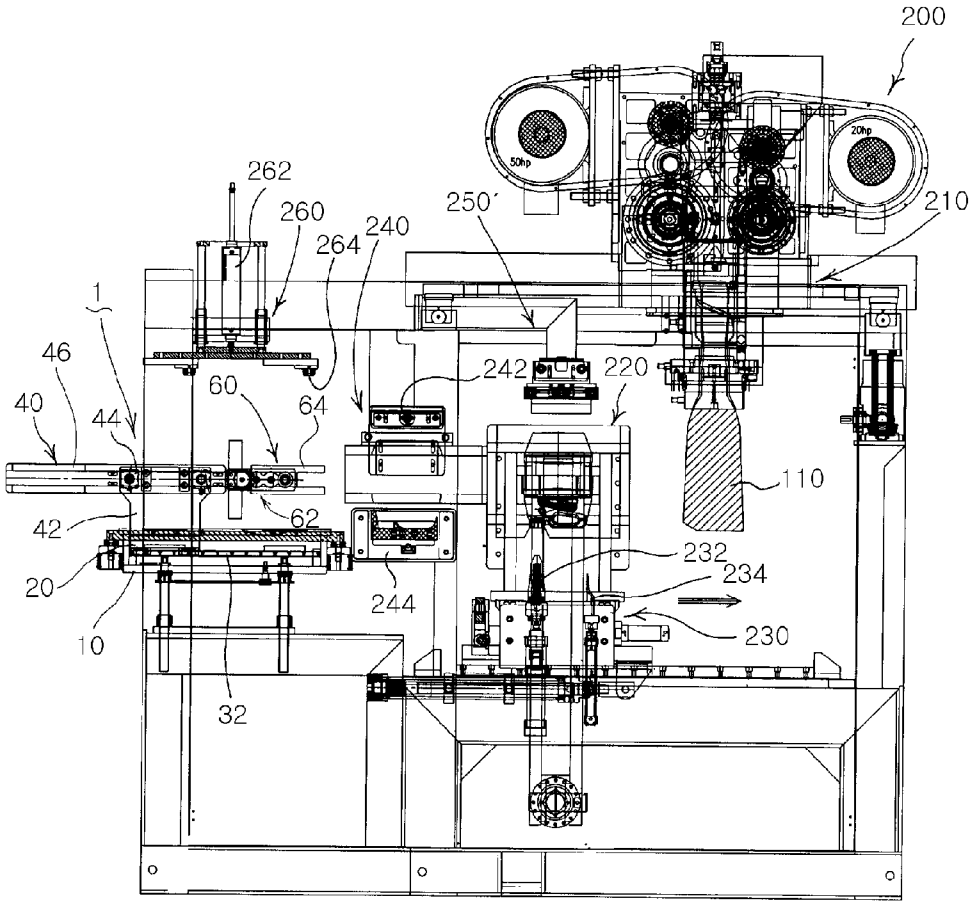
[Fig. 1]


222
220
100a
H1
200
110
224
252
250
210
240
242
100a
212
214
110
220
244
230

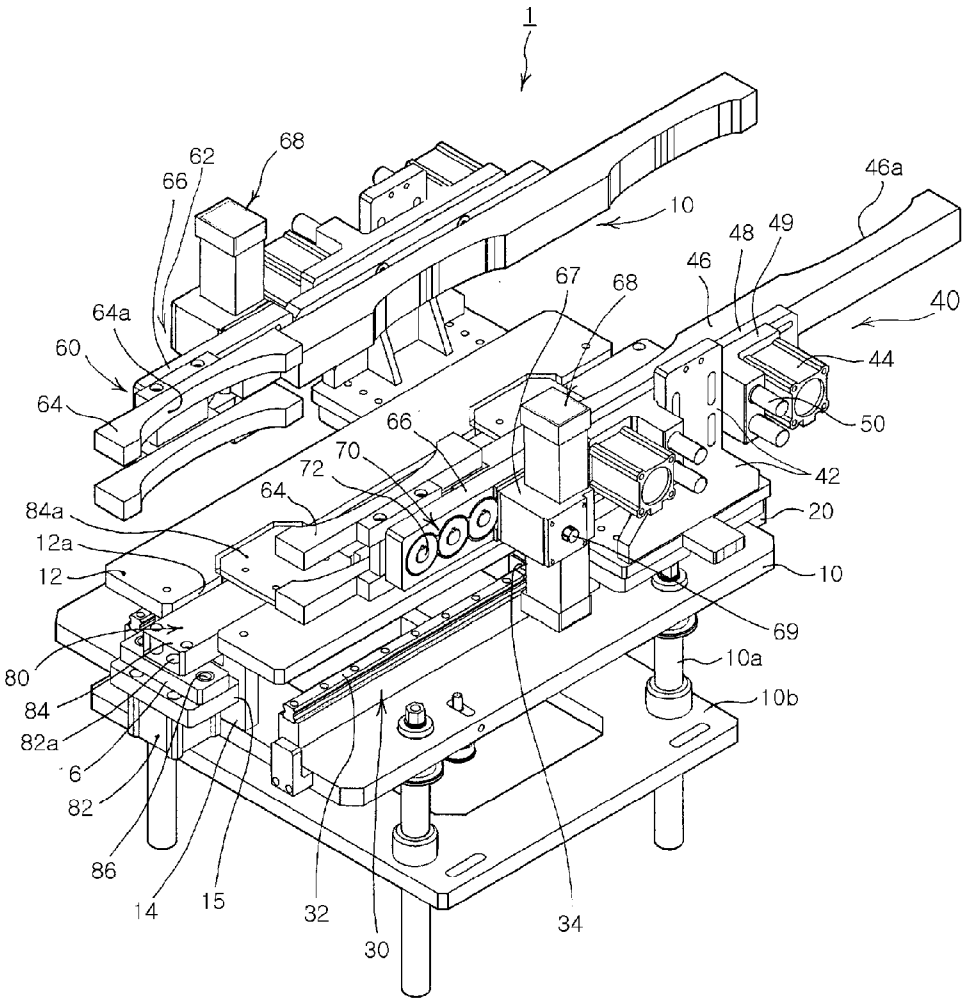
[Fig. 2]


220
222
232
H2
224
234
250'
200
210
242
100b
100b
220
110
234
232
230
240
244

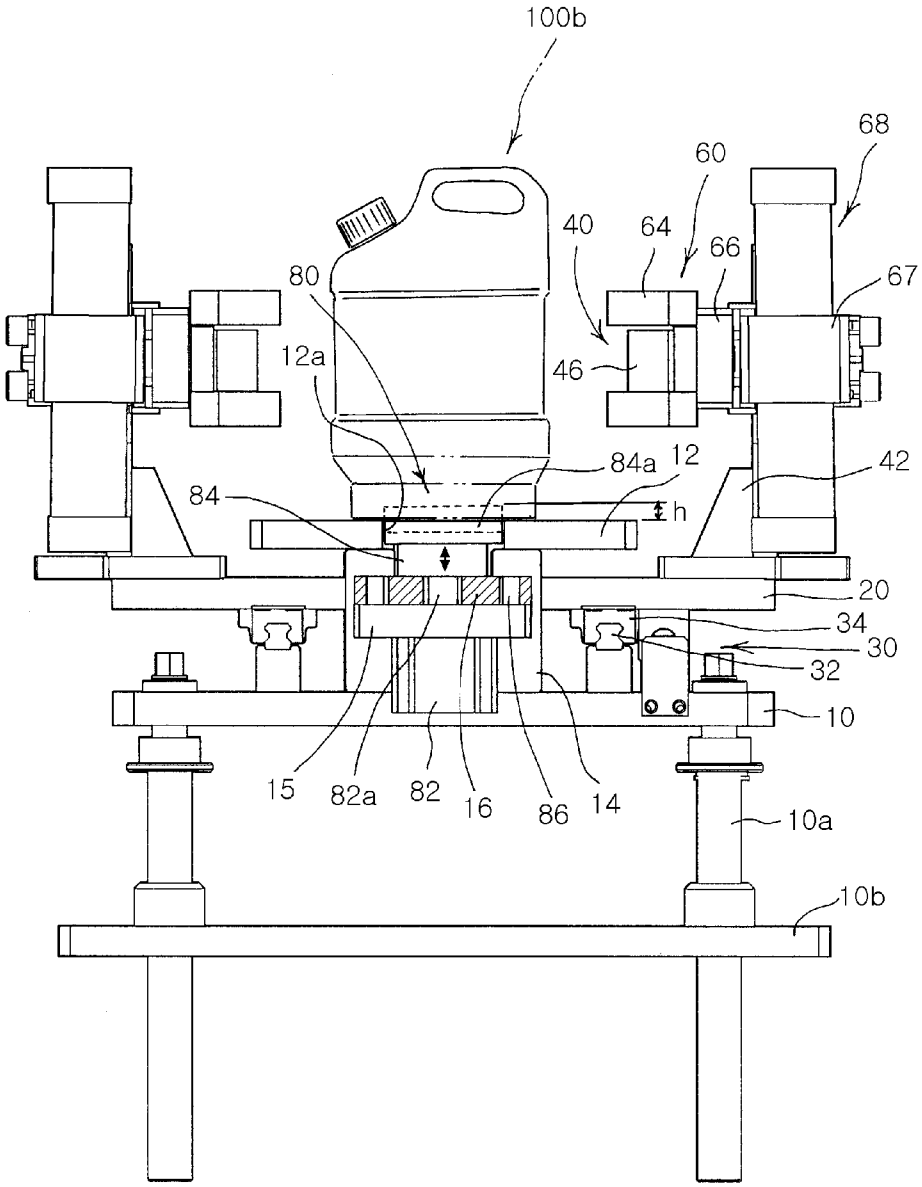
[Fig. 3]


200
262
260
264
240
250
210
1
46
40
44
60
64
242
220
110
42
62
232
234
20
244
230
10
32

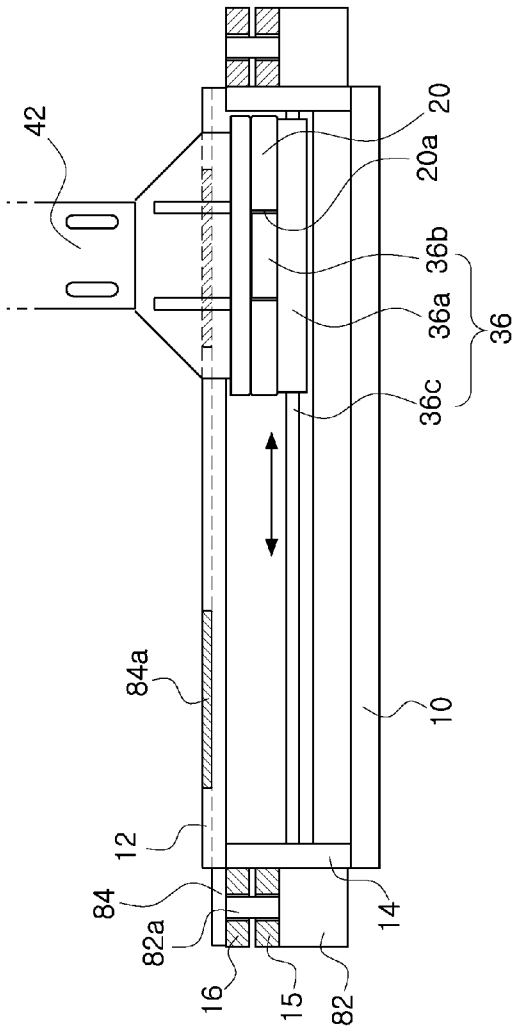
[Fig. 4]


1
68
62
66
10
46a
48
49
46
67
68
40
64a
60
44
64
66
50
70
72
42
64
84a
20
12a
12
10
69
80
10a
84
10b
82a
6
82
86
14
15
32
30
34

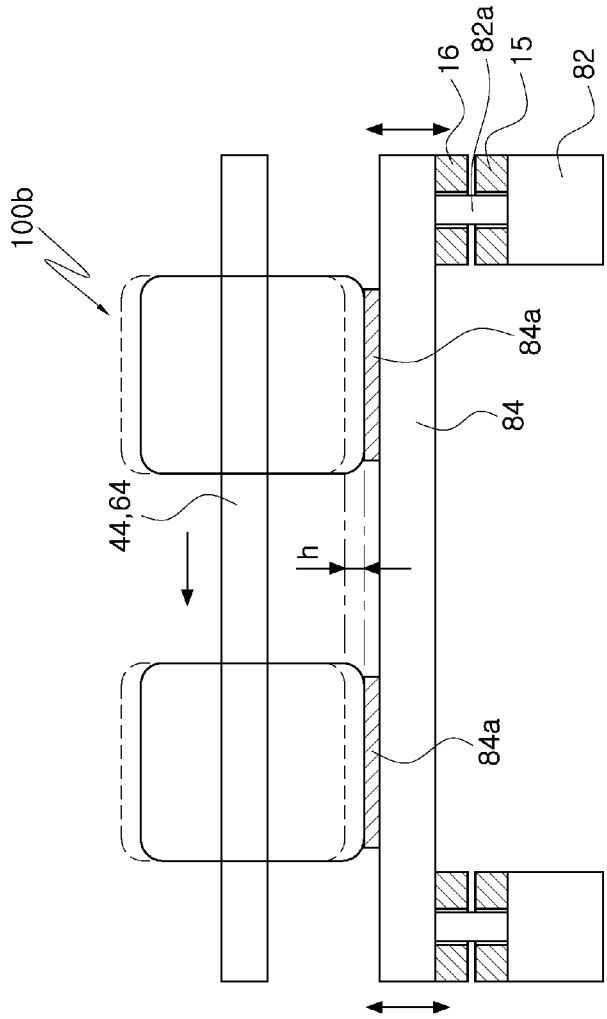
[Fig. 5]


100b
68
60
40
64
66
67
80
12a
46
84a
12
42
84
h
20
34
30
32
10
15
82a
82
16
86
14
10a
10b

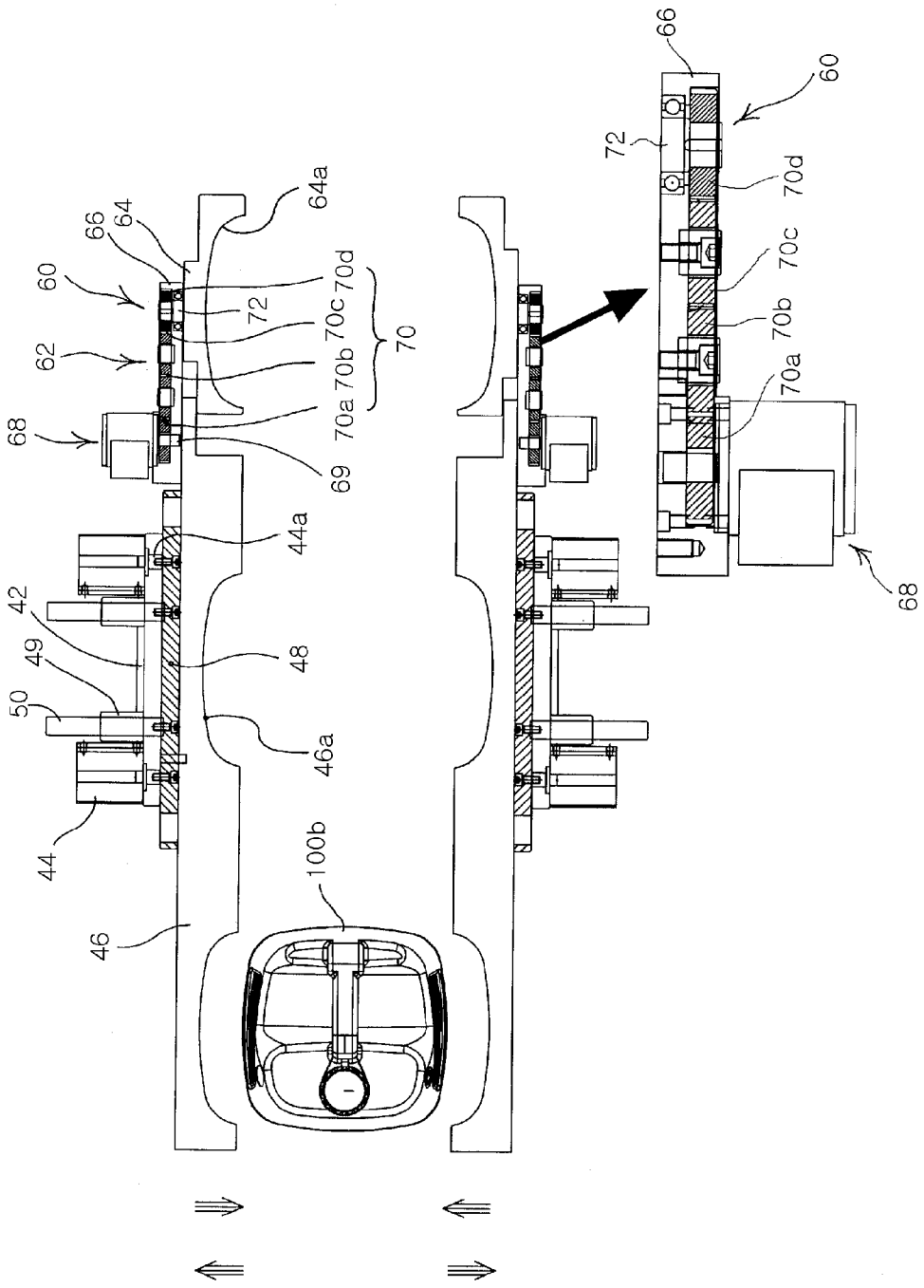
[Fig. 6]



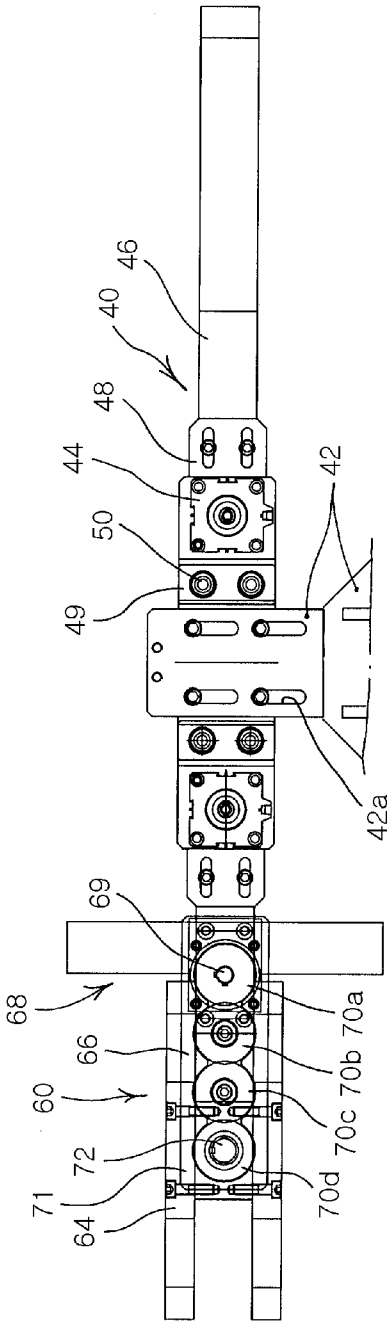
[Fig. 7]



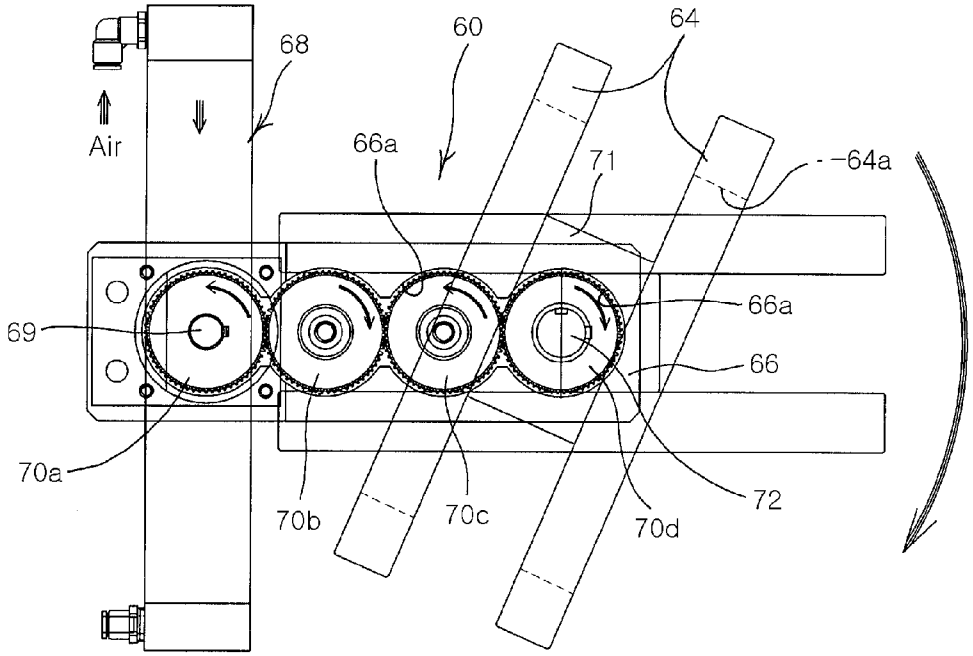
[Fig. 8]


66
60
72
70d
70c
70b
70a
68
64a
64
62
70
69
44a
42
49
48
50
46a
44
100b
46

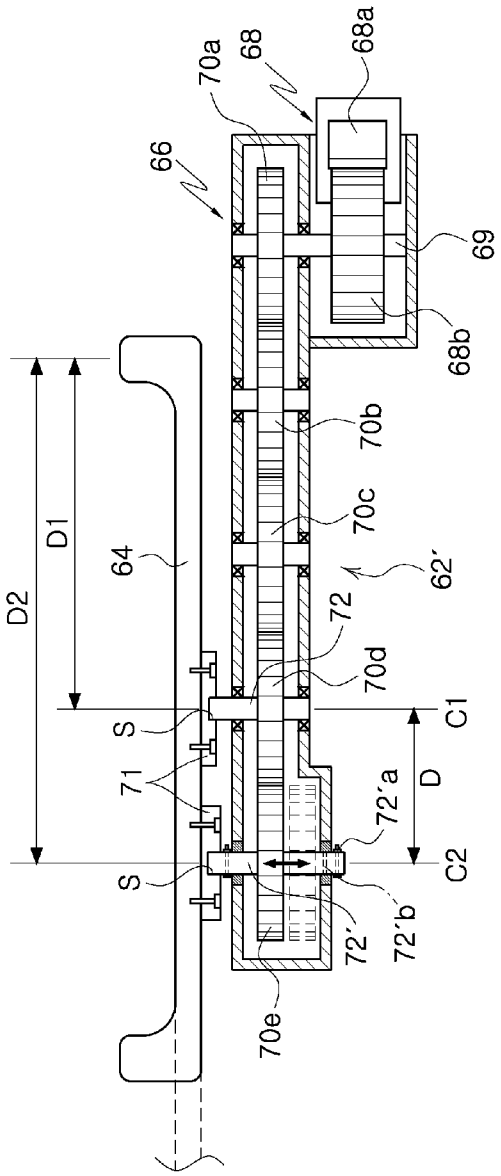
[Fig. 9]



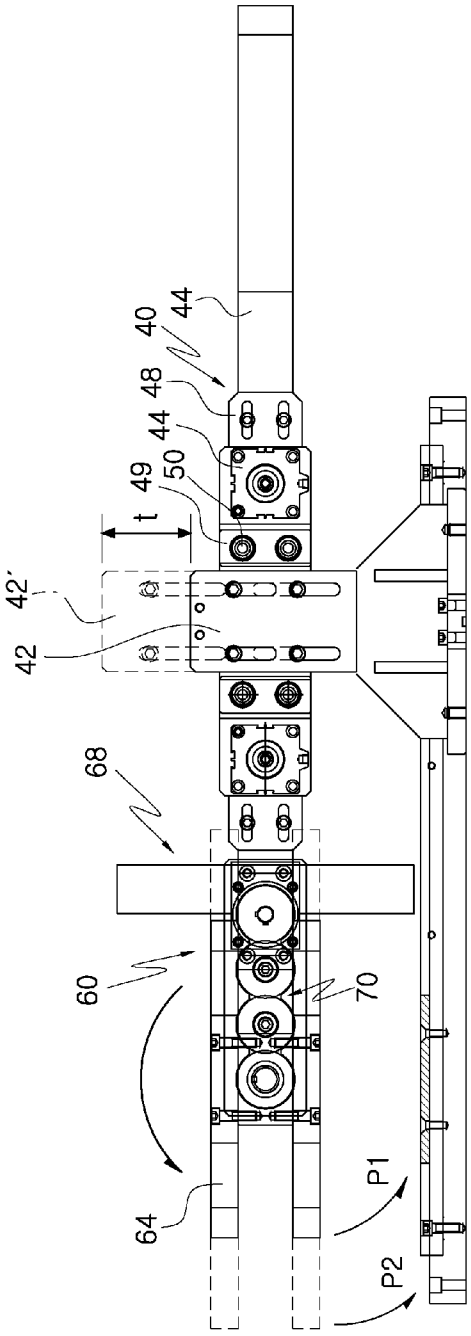
[Fig. 10]



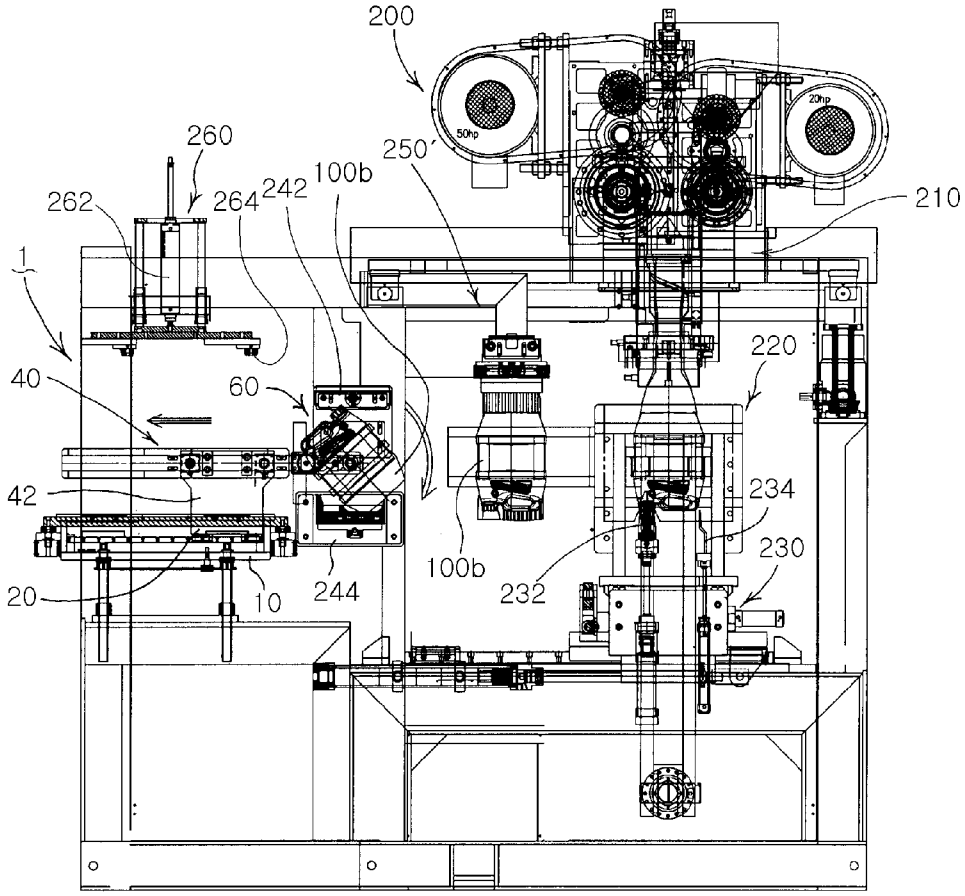
[Fig. 11]


70a
68
68a
66
69
68b
70b
70c
62'
72
70d
C1
D
72'a
C2
72'b
72'
70e
S
71
64
D1
D2

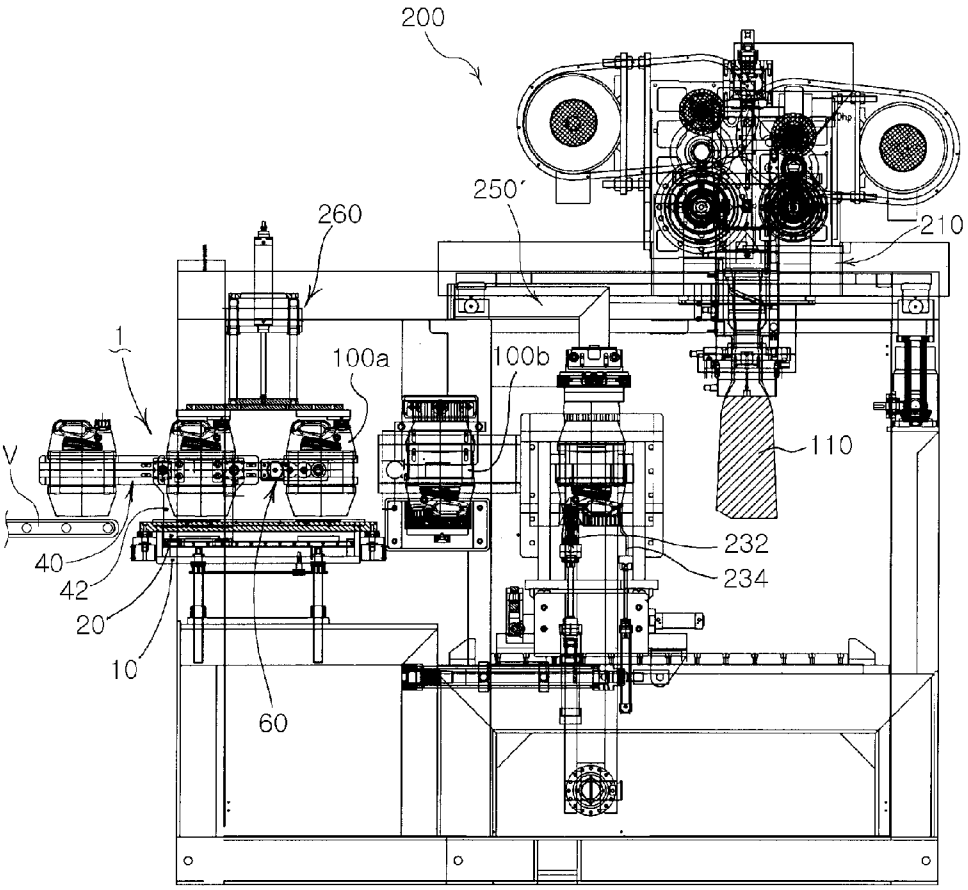
[Fig. 12]



[Fig. 13]


200
260
250
262
264
242
100b
210
1
220
40
60
42
234
230
100b
232
20
10
244

[Fig. 14]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/005110

A. CLASSIFICATION OF SUBJECT MATTER

B65G 47/74(2006.01)i, B29C 49/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 B65G, B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models since 1975
Japanese utility models and applications for utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal) & keywords: rotation, transfer, holder and container

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 4893982 A (TAKAHARU YAMAGUCHI) 16 January 1990 See claims 1-4 and figures 1-4.	1-4, 8 14, 15
A	US 5560471 A (RICHARD PRCCHUT et al.) 01 October 1996 See figures 1-6 and column 1, line 45 - column 2, line 10.	1-15
Y A	WO 00/23253 A1 (FRONTIER INC.) 27 April 2000 See page 1, line 12 - page 9, line 13.	14, 15 16-19

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 JUNE 2008 (23.06.2008)	**23 JUNE 2008 (23.06.2008)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Kwang Oh

Telephone No. 82-42-481-5470

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2007/005110

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4893982 A	16.01.1990	JP 1075128 A2	20.03.1989
		JP 1075129 A2	20.03.1989
		JP 2546857 B2	23.10.1996
US 5560471 A	01.10.1996	AU 1995-35493 A1	19.04.1996
		BR 9408619 A	23.12.1997
		CA 2199472 AA	04.04.1996
		EP 0783447 A1	16.07.1997
		EP 0783447 A4	15.04.1998
		FI 970996 A	21.05.1997
		FI 970996 A0	10.03.1997
		JP 10-506360 T2	23.06.1998
		JP 3814293 B2	23.08.2006
		NO 971144 A	15.04.1997
		NO 971144 A0	12.03.1997
		RU 2133703 C1	27.07.1999
		WO 96-09974 A1	04.04.1996
WO 00-23253 A1	27.04.2000	BR 9906881 A	17.10.2000
		CN 1116979 C	06.08.2003
		CN 1236902 C	18.01.2006
		CN 1246138 C	22.03.2006
		CN 1287527 A	14.03.2001
		CN 1495011 A	12.05.2004
		EP 1070579 A1	24.01.2001
		ID 26314 A	14.12.2000
		JP 2000-117821 A2	25.04.2000
		KR 10-2001-0033395	25.04.2001
		TW 453945 B	11.09.2001
		TW 453945 A	11.09.2001
		US 6457967 BA	01.10.2002