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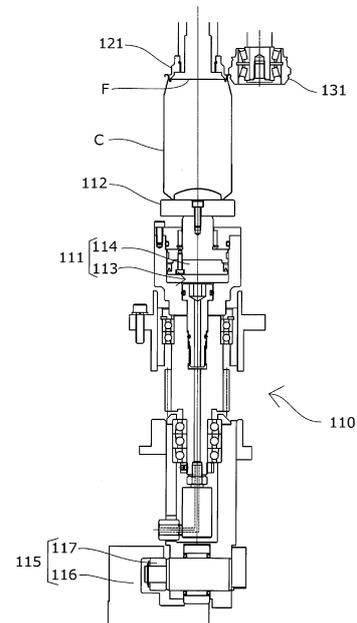
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(54) **SEAMING DEVICE**

(57) Provided is a seaming device that makes it possible to easily adjust an axial load applied to a can during seaming and that makes it possible to prevent the buckling of the can without any shock load being applied, apply a constant axial load according to a decrease in the height of the can during the seaming, and achieve the high speed of a seaming process. The seaming device has a can placement unit (110) that places a can (C), a chuck unit (120) provided opposite the can placement unit, and a seaming roll (131) that seams a lid (F) onto the can (C). The can placement unit (110) has a pressing mechanism (111) that operates by fluid pressure and elastically upwardly presses a plate (112) on which the can (C) is placed.

Fig. 3



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**Description**

[Summary of Invention]

[Technical Field]

[Technical Problem]

**[0001]** The present invention relates to a seaming device having a can placement unit that places a can, a chuck unit provided opposite the can placement unit, and a seaming roll that seams a lid onto the can.

5 **[0008]** In such a known seaming device, when a seaming turret has a can placement unit (lifter) and a knockout pad in each of pockets, the pad is lifted and lowered by a cam mechanism as the seaming turret rotates.

[Background Art]

10 **[0009]** After a can is supplied to each of the pockets of the seaming turret, the can placement unit (lifter) is lifted to sandwich the can and a lid with the chuck to seam the lid.

**[0002]** Conventionally, there have been known seaming devices having a can placement unit that places a can in which a beverage or the like is filled, a chuck unit provided opposite the can placement unit, and a seaming roll that seams a lid onto the can.

15 **[0010]** During seaming, it is desirable to sandwich the can and the lid with a constant axial load, and the force is generated by a pressing mechanism using a spring provided in the can placement unit (lifter).

**[0003]** As shown in, for example, Patent Literature 1, a known seaming device has a seaming turret (1) that performs the step of seaming a can and a lid, an infeed conveyor (supply conveyor 7) that supplies the can onto which the lid has not been seamed to the seaming turret, a lid conveyance turret (supply turret 3) of a lid supply unit that supplies the lid, a discharge turret (discharge turret 5) that carries out the can onto which the lid has been seamed from the seaming turret, and a carrying-out conveyor (discharge conveyor 8) that further carries out the can from the discharge turret to an outside.

20 **[0011]** The constant axial load is set by adjusting a setting length of the spring before the operation of the seaming device starts. However, the can placement unit provided in each of the conveyance pockets has a separate spring. Therefore, the adjustment operation requires enormous time and labor.

**[0004]** Each of the seaming turret, the discharge turret, and the lid conveyance turret has pockets (fitting concave parts 2, 4, and 6) that separately accommodate and convey the can and the lid at their outer peripheral parts.

25 **[0012]** Further, the pressing mechanism is also responsible for absorbing shock caused when the chuck comes in contact with the lid placed on the can, in order to prevent the damage or buckling of the can. A conventional pressing mechanism is provided with a cushioning amount as small as 1 mm or less and requiring a high pre-set load in order to obtain a required axial load, hence does not exhibit sufficient shock absorption.

**[0005]** The seaming turret has, in each of the pockets, a can placement unit (lifter 17) that places the can, a chuck unit (seaming chuck device 10) provided opposite the can placement unit, and seaming rolls (18 and 19) that seam the lid onto the can.

30 **[0013]** It is possible to improve the shock absorption by decreasing a spring constant and increasing a stroke. However, the increase in the stroke causes the upsize of the device, and the decrease in the spring constant easily causes load fluctuations and becomes a factor responsible for inhibiting a speedup. Therefore, it is difficult to achieve both the shock absorption and the speedup.

**[0006]** In the seaming device thus configured, speeds and timings of each of the turrets and each of the conveyors are caused to match each other by gears or the like, and the operations of the can placement unit, the chuck of the chuck unit, and the seaming roll arranged in each of the pockets are caused to be linked to the rotation of the seaming turret by gears, cam mechanisms, or the like. Thus, the can and the lid conveyed at a high speed can be successively seamed while being transferred.

35 **[0014]** Meanwhile, the height of the can slightly decreases during the seaming. Therefore, the can placement unit (lifter) is required to be slightly lifted to keep the axial load of the pressing mechanism constant.

[Citation List]

40 **[0015]** Thus, the can placement unit is required to be slightly lifted and lowered by a cam used in the vertical movement mechanism of the can placement unit (lifter) according to a decreasing amount of the height of the can.

[Patent Literature]

45 **[0016]** However, it is difficult to make the stroke of the cam completely match the decreasing amount of the height of the can. In addition, the decreasing amount of the height of the can is not constant during the seaming. Moreover, the decreasing amount of the height of the can changes also with a seaming dimension (such as standard seam and minimum seam). Therefore, it is difficult to perform an adjustment by which to make the axial load applied to the can during the seaming constant.

**[0007]** Patent Literature 1: Japanese Patent Application Laid-open No. S62-244537

55 **[0017]** Therefore, the device is adjusted to operate with settings that allow for a constant error in the axial load accompanied by the decreasing amount of the height of the can, which in turn causes the prolonged adjustment

of the axial load, the occurrence of the buckling of the can, and a factor responsible for inhibiting a speedup.

**[0018]** Further, the operations of respective movable parts are caused to work together by gears, cams, or the like to make all operation timings match each other as the whole seaming device. However, in order to continuously accurately perform the seaming at a high speed, the operation timings of the respective movable parts are required to be adjusted according to a dimension, a weight, a seaming dimension, or the like of the supplied can. The adjustment operation also requires enormous time and labor.

**[0019]** The present invention has been made to solve the above problems and has an object of providing a seaming device that makes it possible to easily adjust an axial load applied to a can during seaming and that makes it possible to prevent the buckling of the can without any shock load being applied, apply a constant axial load according to a decrease in the height of the can during the seaming, and achieve the high speed of a seaming process.

[Solution to Problem]

**[0020]** In order to solve the above problems, the present invention provides a seaming device including a can placement unit that places a can, a chuck unit provided opposite the can placement unit, and a seaming roll that seams a lid onto the can, wherein the can placement unit has a pressing mechanism that elastically upwardly presses a plate on which the can is placed, and the pressing mechanism is configured to operate by fluid pressure.

[Advantageous Effects of Invention]

**[0021]** According to the seaming device described in claim 1, the pressing mechanism is configured to operate by fluid pressure. Therefore, it is only necessary to adjust supplied fluid pressure by a supply source in order to obtain a constant axial load and becomes possible to easily perform an adjustment operation in a short period of time without separately adjusting the pressing mechanism of the can placement unit provided in each of pockets.

**[0022]** Further, since an axial load is adjusted by fluid pressure, the buckling of the can can be prevented without any shock load being applied.

**[0023]** Moreover, it becomes possible to apply a constant load according to a decrease in the height of the can during seaming, improve seaming accuracy and obtain a secured seaming dimension, and achieve the high speed of a seaming process.

**[0024]** According to the configuration described in claim 2, a vertical movement mechanism that vertically moves the can placement unit is provided. Thus, the vertical movement mechanism can be simplified as a mechanism that only lifts the can placed on the can placement

unit with respect to the chuck of the chuck unit in combination with the pressing mechanism.

**[0025]** According to the configuration described in claim 3, the vertical movement mechanism is configured so as not to operate during a seaming operation of the seaming roll. Thus, it becomes possible to reliably stably perform the operation of the pressing mechanism during the seaming operation.

**[0026]** According to the configuration described in claim 4, rotation of the plate of the can placement unit and the chuck of the chuck unit and the seaming operation of the seaming roll are performed by driving sources that are controlled independently. Thus, the rotation starts and the acceleration timings of the plate and the chuck and the timing and a pressing amount of the seaming operation can be separately optimally adjusted by controlling the respective driving sources without stopping the operation through an operation panel or the like. Therefore, it becomes possible to easily perform an adjustment operation in a short period of time.

**[0027]** According to the configuration described in claim 5, the chuck unit comes in contact with the lid only at the chuck thereof, and the chuck centers and presses the lid. Thus, it becomes possible to easily correct the position of the lid, prevent the buckling of the can without any offset load being applied since the lid is reliably centered, and achieve the thinning of the can.

**[0028]** According to the configuration described in claim 6, the chuck has lid adsorption means, and the lid is centered by the lid adsorption means. Thus, the fitting force between the chuck and the lid is improved, and a seaming failure due to the slip between the chuck and the lid is prevented. Further, since an axial load is decreased and the centering of the lid by the chuck is improved, the buckling of the can can be prevented.

**[0029]** According to the configuration described in claim 7, an infeed conveyor, a lid supply device, and a lid conveyance turret have respective driving sources that are controlled independently. Thus, an operation timing can be separately optimally adjusted without stopping an operation through an operation panel or the like. Therefore, it becomes possible to easily perform the adjustment operation of preventing the deformation of the lid, scratches, dents in the can, and a seaming failure due to the deviation of the operation timing in a short period of time.

**[0030]** According to the configuration described in claim 8, the driving sources are servo motors. Thus, an adjustment can be performed based on an electric control command. Further, it becomes also possible to perform feedback control and easily perform an adjustment operation in a short period of time.

**[0031]** According to the configuration described in claim 9, the seaming turret has detection means for detecting a position of a pocket, and a conveyance path of the infeed conveyor has a pitch sensor that detects an attachment of the infeed conveyor. Thus, it becomes possible to more easily perform the adjustment operation of

the operation timing. Further, it becomes possible to automatically detect and adjust the positional errors of each pocket and each attachment and positional fluctuations during an operation, improve seaming accuracy, and achieve the high speed of a seaming process.

**[0032]** According to the configuration described in claim 10, the pressing mechanism has a diaphragm that seals the fluid pressure. Thus, a sliding sealing member is not required, the plate can be smoothly lifted and lowered without causing sealing resistance when the piston is lifted and lowered.

**[0033]** According to the configuration described in claim 11, the chuck unit has a rotary wing pump that forcibly discharges lubricant. Thus, the lubricant stored on an oil seal is minimized, whereby the leakage and spoiling of the lubricant from the oil seal due to the rotation of the chuck can be prevented.

[Brief Description of Drawings]

**[0034]**

[Fig. 1] Fig. 1 is an explanatory view of the conveyance path of a seaming device according to an embodiment of the present invention.

[Fig. 2] Fig. 2 is an explanatory view of the cross section of the seaming device according to the embodiment of the present invention.

[Fig. 3] Fig. 3 is an enlarged explanatory view of the can placement unit of the seaming device according to the embodiment of the present invention.

[Fig. 4] Fig. 4 is an enlarged explanatory view of a can during seaming.

[Fig. 5] Fig. 5 is an enlarged explanatory view of the can during handling.

[Fig. 6] Fig. 6 is an explanatory view of the conveyance path of a seaming device according to another embodiment of the present invention.

[Fig. 7] Fig. 7 is an enlarged explanatory view of another embodiment of the pressing mechanism of a can placement unit.

[Fig. 8] Fig. 8 is an enlarged explanatory view of another embodiment of a chuck unit.

[Fig. 9] Fig. 9 is a cross-sectional view of Fig. 8.

[Reference Signs List]

**[0035]**

100 Seaming device  
101 Seaming turret  
102 Infeed conveyor  
103 Attachment  
104 Lid supply unit  
105 Lid supply device  
106 Lid conveyance turret  
107 Discharge turret  
108 Carrying-out conveyor

110 Can placement unit  
111 Pressing mechanism  
112 Plate  
113 Cylinder space  
5 114 Piston  
115 Vertical movement mechanism  
116 Vertical movement cam  
117 Vertical movement cam follower  
118 Diaphragm  
10 120 Chuck unit  
121 Chuck  
125 Negative-pressure absorption hole (Lid adsorption means)  
126 Chuck outer peripheral part  
15 127 Rotary wing pump  
128 Discharge tube  
129 Oil seal  
130 Seaming unit  
131 Seaming roll  
20 132 Roll swinging shaft  
151 Driving motor (Driving source) of seaming turret  
152 Driving motor (Driving source) of lid conveyance turret  
153 Driving motor (Driving source) of lid supply device  
25 154 Driving motor (Driving source) of infeed conveyor  
155 Pocket position detection encoder (Detection means)  
30 156 Driving motor (Driving source) of chuck  
157 Driving motor (Driving source) of can placement unit  
158 Driving motor (Driving source) of roll swinging shaft  
35 C Can (onto which lid has not been seamed)  
F Lid  
CM Can (onto which lid has been seamed)  
P Pocket  
E Seaming interval  
40 G Merging point

[Description of Embodiments]

**[0036]** As shown in Fig. 1, a seaming device 100 according to an embodiment of the present invention has a seaming turret 101 that performs the step of seaming a can C and a lid F, an infeed conveyor 102 that supplies the can C onto which the lid F has not been seamed to the seaming turret 101, a lid supply unit 104 that has a lid supply device 105 to supply the lid F and a lid conveyance turret 106, a discharge turret 107 that carries out the can CM onto which the lid F has been seamed from the seaming turret 101, and a carrying-out conveyor 108 that carries out the can CM from the discharge turret 107 to an outside.

**[0037]** Each of the seaming turret 101, the discharge turret 107, and the lid conveyance turret 106 has pockets P that separately accommodate and convey the cans C

and CM and the lid F at their outer peripheral parts, and the infeed conveyor 102 has attachments 103 that separately engage and convey the can C.

**[0038]** Rotation speeds of the seaming turret 101, the discharge turret 107, and the lid conveyance turret 106, a movement speed of the attachments 103 of the infeed conveyor 102, and a timing at which the respective pockets P and the attachments 103 work together are adjustably designed so that the cans C and CM and the lid F are smoothly transferred between the respective turrets and the conveyors.

**[0039]** As shown in Fig. 2, the seaming turret 101 that performs the step of seaming the can C and the lid F has, in each of the pockets P, a can placement unit 110 that places the can C, a chuck unit 120 that has a chuck 121 provided opposite the can placement unit 110, and a seaming unit 130 that has a seaming roll 131 to seam the lid F onto the can C.

**[0040]** The seaming turret 101 is rotationally driven by a driving motor 151 and so configured that the positions of the pockets are detectable by a pocket position detection encoder 155 based on its rotation phase.

**[0041]** Further, the conveyance path of the infeed conveyor 102 has a pitch sensor S composed of a phototube, a proximity switch, a laser, or the like to detect the positions of the attachments 103 of the infeed conveyor 102, and the positions of the attachments 103 with respect to the pockets P of the seaming turret 101 and the lid conveyance turret 106 are controlled based on the output of the pitch sensor S.

**[0042]** By detecting and controlling the positions of the attachments as described above, it becomes possible to more easily perform an adjustment operation, automatically detect and adjust the positional errors of the respective pockets and the attachments and positional fluctuations during an operation, improve seaming accuracy, and achieve the high speed of a seaming process.

**[0043]** The lid supply device 105, the lid conveyance turret 106, and the infeed conveyor 102 are driven by independently-controlled driving sources, i.e., a driving motor 153 of the lid supply device 105, a driving motor 152 of the lid conveyance turret 106, and a driving motor 154 of the infeed conveyor 102, respectively.

**[0044]** As described above, the infeed conveyor 102, the lid supply device 105, and the lid conveyance turret 106 are driven by the independently-controlled driving sources. Thus, an operation timing can be separately optimally adjusted without stopping an operation through an operation panel or the like, and the adjustment operation of preventing the deformation of the lid, scratches, dents in the can, and a seaming failure due to the deviation of the operation timing can be easily performed in a short period of time.

**[0045]** Servo motors are employed as the respective motors, and the motors are configured to be capable of separately adjusting their speeds and timings and also configured to be capable of following fluctuations in the speed and the timing of the seaming turret 101 according

to the output of the pocket position detection encoder 155.

**[0046]** Similarly, a plate 112 and a chuck 121 are driven to rotate by independently-controlled driving sources, i.e., a driving motor 157 of the can placement unit 110 and a driving motor 156 of the chuck 121 as driving sources, respectively, and a roll swinging shaft 132 is driven by an independently-controlled driving source, i.e., a driving motor 158 of the roll swinging shaft 132 as a driving source.

**[0047]** As described above, the plate 112, the chuck 121, and the roll swinging shaft 132 are driven by the independently-controlled driving sources. Thus, the rotation starts and the acceleration timings of the plate 112 and the chuck 121 and the timing and a pressing amount of a seaming operation can be separately optimally adjusted by controlling the respective driving sources without stopping an operation through an operation panel or the like. Therefore, it becomes possible to perform an adjustment operation in a short period of time.

**[0048]** Moreover, servo motors are employed as the driving sources. Thus, an adjustment can be performed based on an electric control command. Further, it becomes also possible to perform feedback control and easily perform an adjustment operation in a short period of time.

**[0049]** Note that the discharge turret 107 and the carrying-out conveyor 108 not shown in Fig. 2 transfer only the can CM onto which the lid has been seamed and allows for the deviations of their timings and speeds to a certain extent. Therefore, an appropriate driving source may be used to mechanically drive the discharge turret 107 and the carrying-out conveyor 108 via a transmission mechanism from the driving motor 151 of the seaming turret 101.

**[0050]** The can placement unit 110 has the plate 112 on which the can C is to be placed and a pressing mechanism 111 that elastically upwardly presses the plate 112.

**[0051]** As shown in Fig. 3, the pressing mechanism 111 is so configured that a piston 114 onto which the plate 112 is fixed is inserted in the cylinder space 113, and elastically upwardly presses the plate 112 when pressure fluid such as compressed air is supplied into the cylinder space 113.

**[0052]** As described above, the pressing mechanism 111 operates with fluid pressure such as compressed air. Therefore, it is only necessary to adjust supplied fluid pressure by a supply source in order to obtain a constant axial load and becomes possible to easily perform an adjustment operation in a short period of time without separately adjusting the pressing mechanism 111 of the can placement unit 110 provided in each of the pockets P.

**[0053]** Further, since an axial load is adjusted by fluid pressure, the buckling of the can C can be prevented without any shock load being applied.

**[0054]** Moreover, it becomes possible to apply a constant load according to a decrease in the height of the

can during the seaming, improve seaming accuracy to obtain a secured seaming dimension, and achieve the high speed of a seaming process.

**[0055]** Further, the can placement unit 110 is vertically moved by a vertical movement mechanism 115 of the can placement unit 110 composed of a vertical movement cam 116 and a vertical movement cam follower 117.

**[0056]** The vertical movement cam 116 is fixedly provided. As the seaming turret 101 rotates, the vertical movement cam follower 117 moves following a cam profile and the can placement unit 110 vertically moves according to the position.

**[0057]** Since the vertical movement mechanism 115 that vertically moves the can placement unit 110 is provided, the vertical movement mechanism 115 can be simplified as a mechanism that only lifts the can C placed on the can placement unit 110 with respect to the chuck 121 in combination with the pressing mechanism 111.

**[0058]** Note that when the vertical movement mechanism 115 of the can placement unit 110 is configured so as not to operate during the seaming operation of the seaming roll, it becomes possible to reliably stably perform the operation of the above pressing mechanism 111 during the seaming operation.

**[0059]** As shown in Fig. 4, the chuck 121 of the above chuck unit 120 is configured to perform centering by fitting its chuck outer peripheral part 126 into the lid F.

**[0060]** The chuck 121 does not have a conventional knockout pad at its central part as shown in the figure and is configured to come in contact with the lid F alone to center and press the lid F with respect to the can C.

**[0061]** As described above, the lid F is centered only by the chuck 121. Thus, it becomes possible to easily correct the position of the lid F, prevent the buckling of the can C without any offset load being applied, and achieve the thinning of the can C.

**[0062]** Further, the chuck 121 is fixedly provided so as to be rotatable, and, as described above, the rotation of the plate 112 of the can placement unit 110 and the chuck 121 is performed by the above controllable driving sources.

**[0063]** As shown in Fig. 5, the lid F may be centered by being adsorbed onto the chuck 121 by a negative-pressure absorption hole 125 provided at its central part rather than being centered by the above chuck, and then the can placement unit 110 may be lifted to place the lid F on the can C.

**[0064]** As described above, the lid F is adsorbed onto the chuck 121 in advance to increase a fitting force. Thus, a seaming failure due to a slip is prevented. Therefore, it becomes possible to decrease an axial load applied to the can C, prevent the buckling of the can C, and attain the thinning of the can C.

**[0065]** Further, when the lid F is placed on the can C, the lid F is reliably centered by the adsorption of the chuck 121 to be placed on the can C. Therefore, the buckling of the can C due to an offset load is prevented.

**[0066]** In addition, the rotation of the chuck 121 is con-

trolled to control rotation caused when the lid F is adsorbed onto the chuck 121. Thus, the lid F can be stably reliably adsorbed by the chuck.

**[0067]** Moreover, the rotation of the plate 112 of the can placement unit 110 is controlled. Thus, the rotation of the plate 112 and the chuck 121 is controlled at a low speed in cooperation with the control of the rotation of the chuck 121. Therefore, dents, scratches, or the like in the can C caused when the can C and a lateral guide member or the like contact each other can be prevented with a reduction in the deviation of a rotation center.

**[0068]** In this case as well, the rotation of the plate 112 of the can placement unit 110 and the chuck 121 of the chuck unit 120 is performed by the above controllable driving sources as described above.

**[0069]** The operation of the seaming device 100 thus configured will be described.

**[0070]** The can C onto which lid F has not been seamed is conveyed while engaging each of the attachments 103 of the infeed conveyor 102 and directed to the seaming turret 101.

**[0071]** On the other hand, the lid F is cut out one by one and transferred from the lid supply device 105 to each of the pockets P of the lid conveyance turret 106 and directed to the seaming turret 101 by the rotation of the lid conveyance turret 106.

**[0072]** Speeds and timings of the infeed conveyor 102 and the lid conveyance turret 106 are adjusted according to a speed and a timing of the seaming turret 101 to align the centers of the can C and the lid F with each other at a merging point G. The can placement unit 110 of which rotation is controlled by the driving motor (servo motor) 157 is lifted at the merging point G to place the lid F on the can C placed on the plate 112.

**[0073]** After that, when the can placement unit 110 is further lifted, the chuck 121 of which rotation is controlled by the driving motor (servo motor) 156 is fitted into the lid F to center the lid F (see Fig. 4). The can C on which the lid F has been placed is sandwiched between the plate 112 and the chuck 121 at a constant axial load for seaming while resisting the pressing force of the pressing mechanism 111 of the can placement unit 110.

**[0074]** When the can C on which the lid F has been placed is sandwiched, a mechanism that elastically upwardly presses the plate 112 with pressure fluid such as compressed air is used as the pressing mechanism 111. Therefore, all the pockets P obtain a constant pressure force, and the obtained pressure force is constant regardless of a pressing and lowering amount of the plate 112. Therefore, an adjustment is really easily performed, and the pressure force does not fluctuate during an operation.

**[0075]** When the seaming turret 101 further rotates, the plate 112 and the chuck 121 are accelerated to their rotation numbers for seaming before the sandwiched can C reaches a seaming interval E shown in Fig. 1.

**[0076]** Mechanical mechanisms may be used as driving sources for rotating the plate 112 and the chuck 121

to be linked to the rotational phase of the seaming turret 101. However, when the independently-controlled servo motors 157 and 156 are used as driving sources, the rotation starts and the acceleration timings of the plate 112 and the chuck 121 can be independently controlled, an adjustment is separately optimally performed without stopping the operation, an adjustment operation is easily performed in a short period of time, and fluctuations during the operation can be addressed.

**[0077]** Further, when the rotation starts and the acceleration timings of the plate 112 and the chuck 121 are controlled to lift and lower the can C on which the lid has been placed with the plate 112 of the rotating can placement unit 110 and fit the chuck 121 of the rotating chuck unit 120 into the lid F placed on the can C, the rotation of the plate 112 and the chuck 121 is controlled to stop or slow down and the deviation of a rotation center is reduced. Thus, dents, scratches, or the like in the can C due to a contact with a guide member or the like can be prevented, and the performance of centering the lid F with the chuck 121 can be improved.

**[0078]** When the can C passes through the seaming interval E, the roll swinging shaft 132 of the seaming unit 130 is operated by the driving motor (servo motor) 158 and the seaming roll 131 is pressed from its lateral side to perform seaming.

**[0079]** In the figure, the seaming roll 131 is singly shown. However, the roll swinging shaft 132 actually includes two seaming rolls 131 for primary seaming and secondary seaming, and the two seaming rolls 131 are sequentially pressed to complete the seaming when the can C passes through the seaming interval E.

**[0080]** A mechanical mechanism may be used as a driving source for the roll swinging shaft 132 to be linked to the rotational phase of the seaming turret 101. However, when the independently-controlled servo motor 158 is used as a driving source, a timing and a pressing amount of the seaming operation of the seaming roll 131 are independently controlled, an adjustment is separately optimally performed without stopping the operation, an adjustment operation is easily performed in a short period of time, and fluctuations during the operation can be addressed.

**[0081]** Further, the mechanism that elastically upwardly presses the plate 112 with pressure fluid such as compressed air is used as the pressing mechanism 111. Therefore, an axial load does not fluctuate even if the error of an actual decreasing amount of the height of the can C is absorbed by the pressing mechanism 111 when the height of the can C slightly decreases during the seaming, seaming accuracy is improved, and the high speed of a seaming process is achieved.

**[0082]** The can CM onto which the lid F has been seamed is transferred from the seaming turret 101 to the discharge turret 107 and then transferred from the discharge turret 107 to the carrying-out conveyor 108 to be carried out to a next step such as inspection and packaging.

**[0083]** In a seaming device 100b according to another embodiment of the present invention, the above chuck 121 has the negative-pressure absorption hole 125 serving as lid adsorption means (see Fig. 5). As shown in Fig. 6, the lid conveyance turret 106 is arranged so that a position Gb for absorbing the lid F onto the chuck 121 by negative pressure is positioned on the upstream side of the seaming turret 101 with respect to the merging point G (see Fig. 1) of the above embodiment.

**[0084]** In the embodiment, the lid F is first absorbed onto the chuck 121 by negative pressure to be centered as shown in Fig. 5 at the position Gb at which the lid F on the upstream side is absorbed onto the chuck 121 of the chuck unit 120 by negative pressure.

**[0085]** After that, at the merging point G, the can C is supplied onto the plate 112 of the can placement unit 110, the lid F that has been adsorbed onto the chuck 121 of the chuck unit 120 is placed on the can C when the can placement unit 110 is lifted, and the can C is sandwiched between the plate 112 and the chuck 121 at a constant axial load for seaming while resisting the pressing force of the pressing mechanism 111.

**[0086]** Thus, it becomes possible to center the lid F alone.

**[0087]** Fig. 7 shows a can placement unit 110b having a pressing mechanism in another embodiment. As shown in the figure, a pressing mechanism 111b is configured to cause a piston 114b that lifts and lowers a plate 112b to maintain air tightness with respect to cylinder space 113b by a diaphragm 118b.

**[0088]** Thus, the plate 112b can be smoothly lifted and lowered without causing sealing resistance when the piston 114b is lifted and lowered.

**[0089]** Figs. 8 and 9 show another embodiment of the chuck unit in the seaming device of the present invention. As shown in the figures, a rotary wing pump 127c that rotates with the rotation of a chuck 121c is provided right above an oil seal 129c at the lowest end of a chuck unit 120c, and lubricant is forcibly discharged from a discharge tube 128c with the rotation of the rotary wing pump 127c.

**[0090]** Thus, the lubricant stored on the oil seal 129c is minimized, whereby the leakage and spoiling of the lubricant from the oil seal 129c due to the rotation of the chuck 121c can be prevented.

## Claims

1. A seaming device comprising a can placement unit that places a can, a chuck unit provided opposite the can placement unit, and a seaming roll that seams a lid onto the can, wherein the can placement unit has a pressing mechanism that elastically upwardly presses a plate on which the can is placed, and the pressing mechanism is configured to operate by fluid pressure.

2. The seaming device according to claim 1, comprising a vertical movement mechanism that vertically moves the can placement unit.
3. The seaming device according to claim 2, wherein the vertical movement mechanism is configured so as not to operate during a seaming operation of the seaming roll. 5
4. The seaming device according to any one of claims 1 to 3, wherein rotation of the plate of the can placement unit and a chuck of the chuck unit and the seaming operation of the seaming roll are performed by driving sources that are controlled independently. 10 15
5. The seaming device according to any one of claims 1 to 4, wherein the chuck unit comes in contact with the lid only at the chuck thereof, and the chuck centers and presses the lid. 20
6. The seaming device according to any one of claims 1 to 4, wherein the chuck has lid adsorption means, and the lid is centered by the lid adsorption means. 25
7. The seaming device according to any one of claims 1 to 6, comprising an infeed conveyor that supplies the can to a seaming turret, and a lid supply unit that has a lid supply device to supply the lid and a lid conveyance turret, wherein the infeed conveyor, the lid supply device, and the lid conveyance turret have respective driving sources that are controlled independently. 30 35
8. The seaming device according to claim 4 or 7, wherein the driving sources are servo motors. 40
9. The seaming device according to claim 7 or 8, wherein the seaming turret has detection means for detecting a position of a pocket, a conveyance path of the infeed conveyor has a pitch sensor that detects an attachment of the infeed conveyor, a speed of the infeed conveyor is controlled by an output of the detection means, and a position of the attachment with respect to pockets of the seaming turret and the lid conveyance turret are controlled by an output of the pitch sensor. 45 50
10. The seaming device according to any one of claims 1 to 9, wherein the pressing mechanism has a diaphragm that seals the fluid pressure. 55
11. The seaming device according to any one of claims 1 to 10, wherein the chuck unit has a rotary wing pump that forcibly discharges lubricant.

Fig. 1

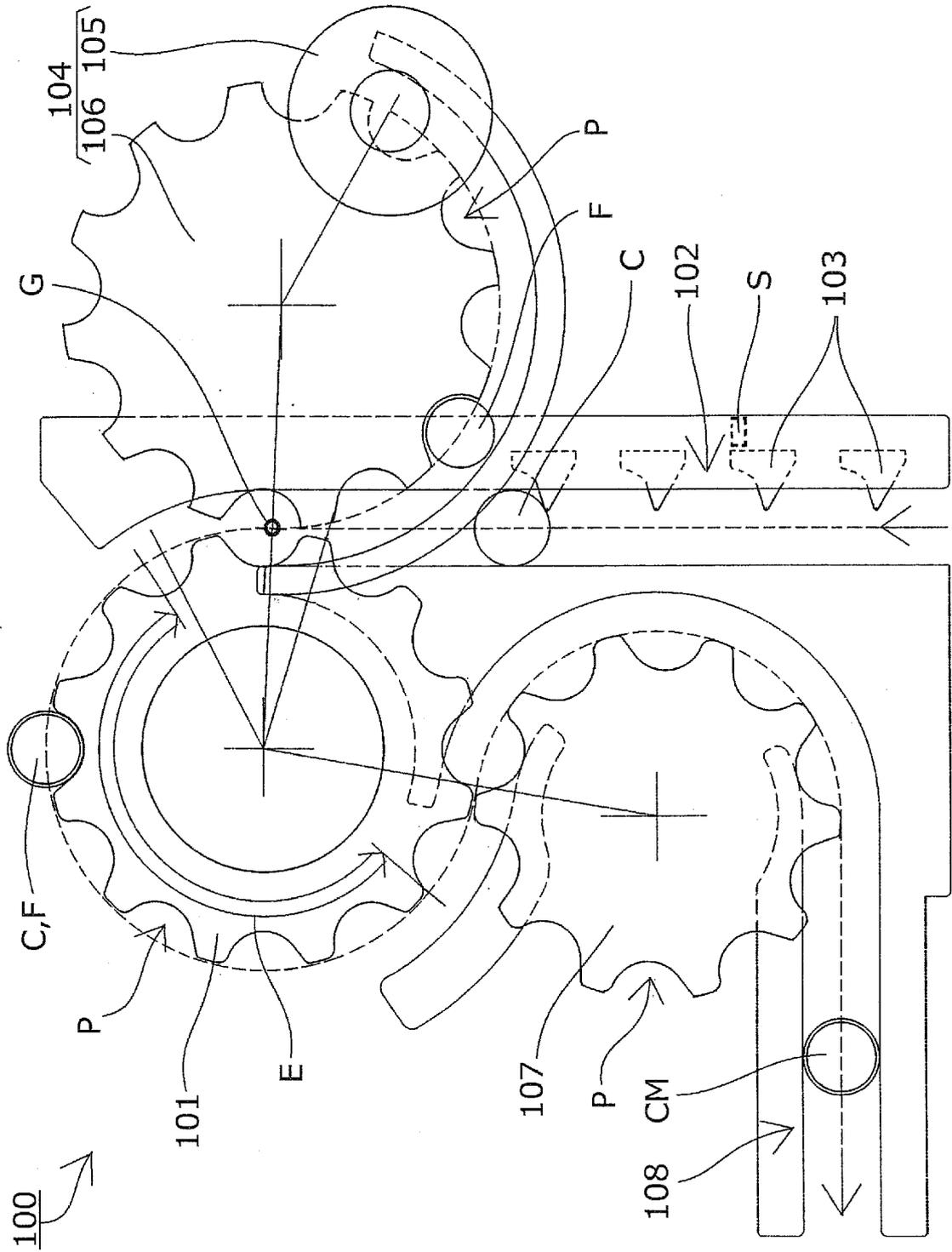


Fig. 2

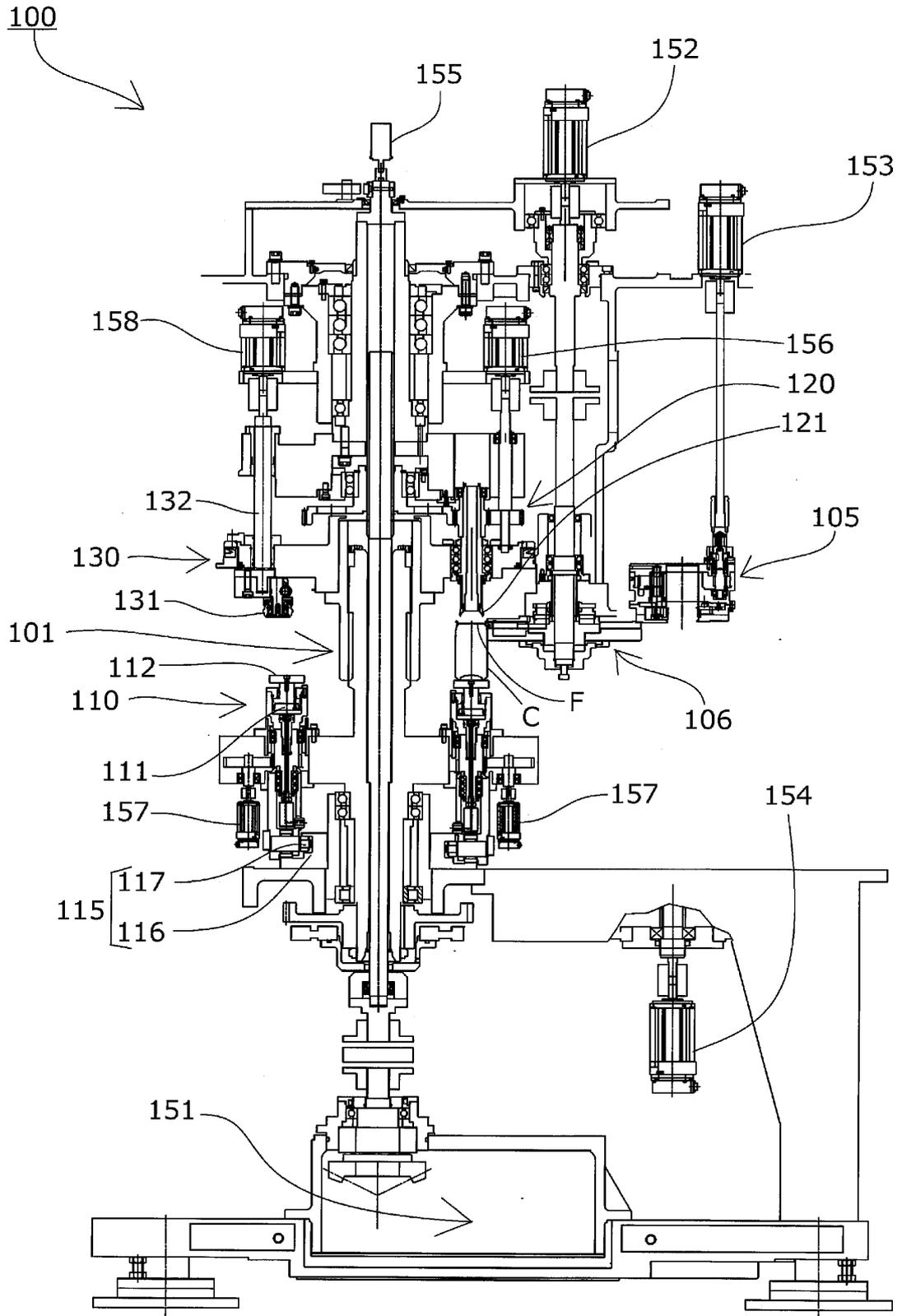


Fig. 3

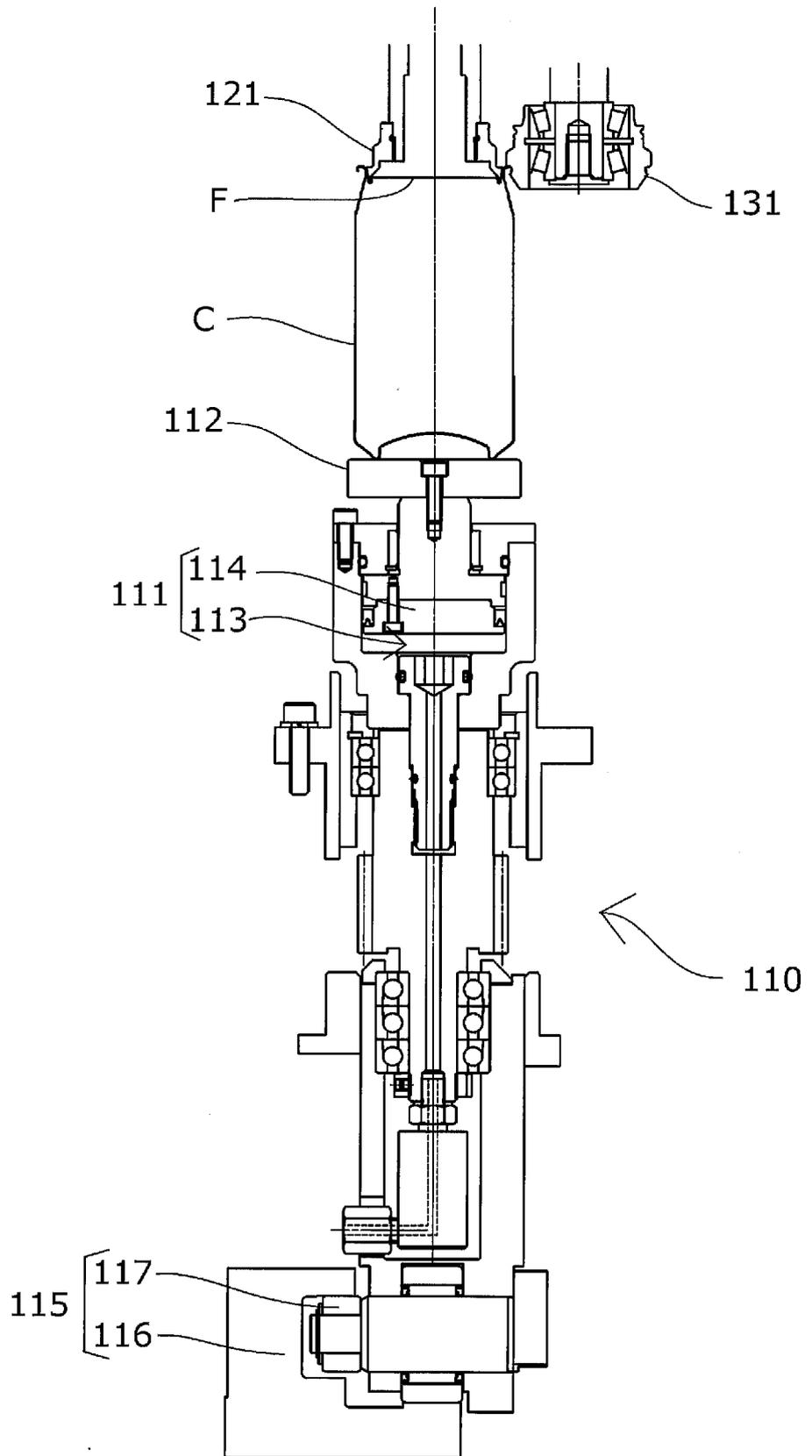


Fig. 4

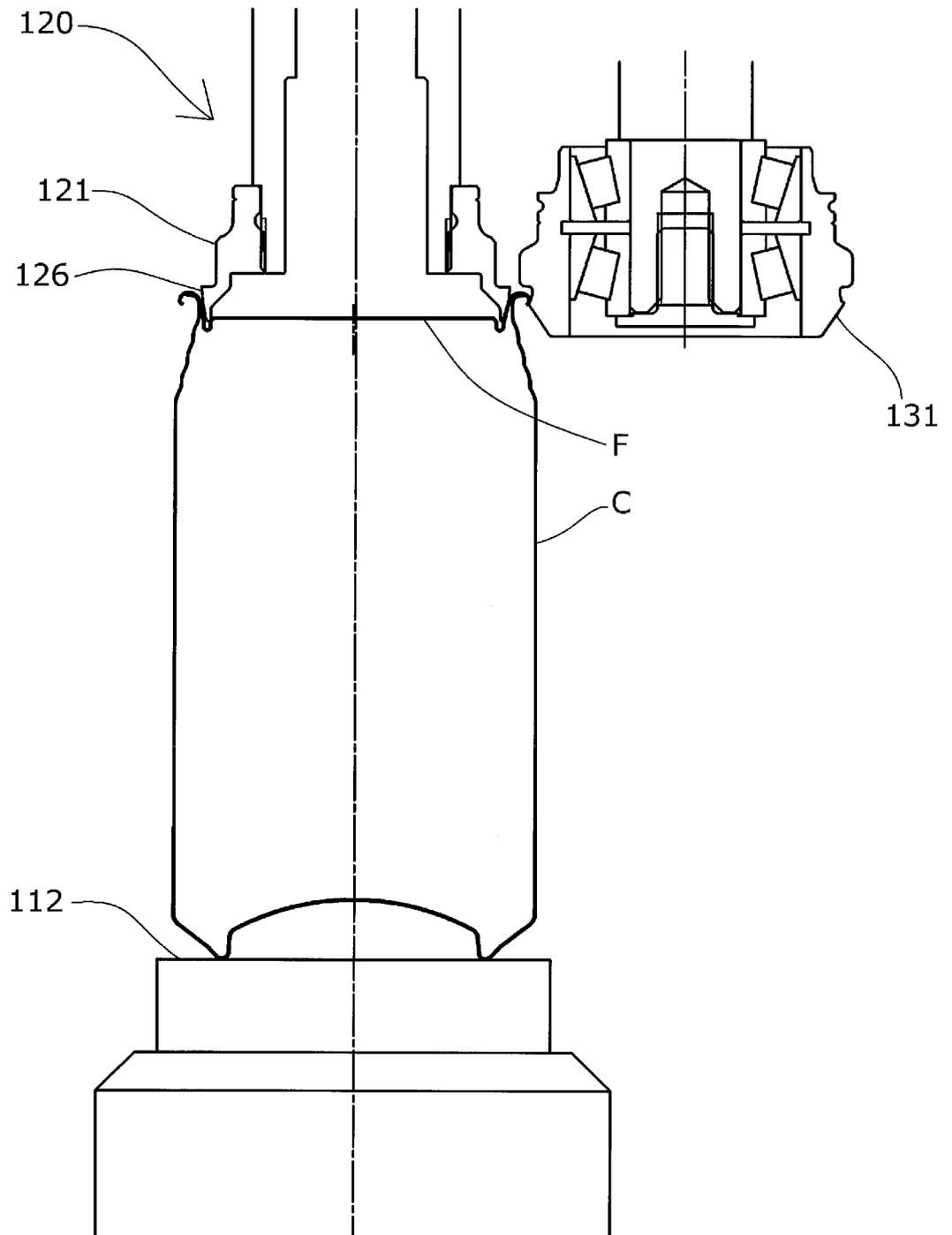


Fig. 5

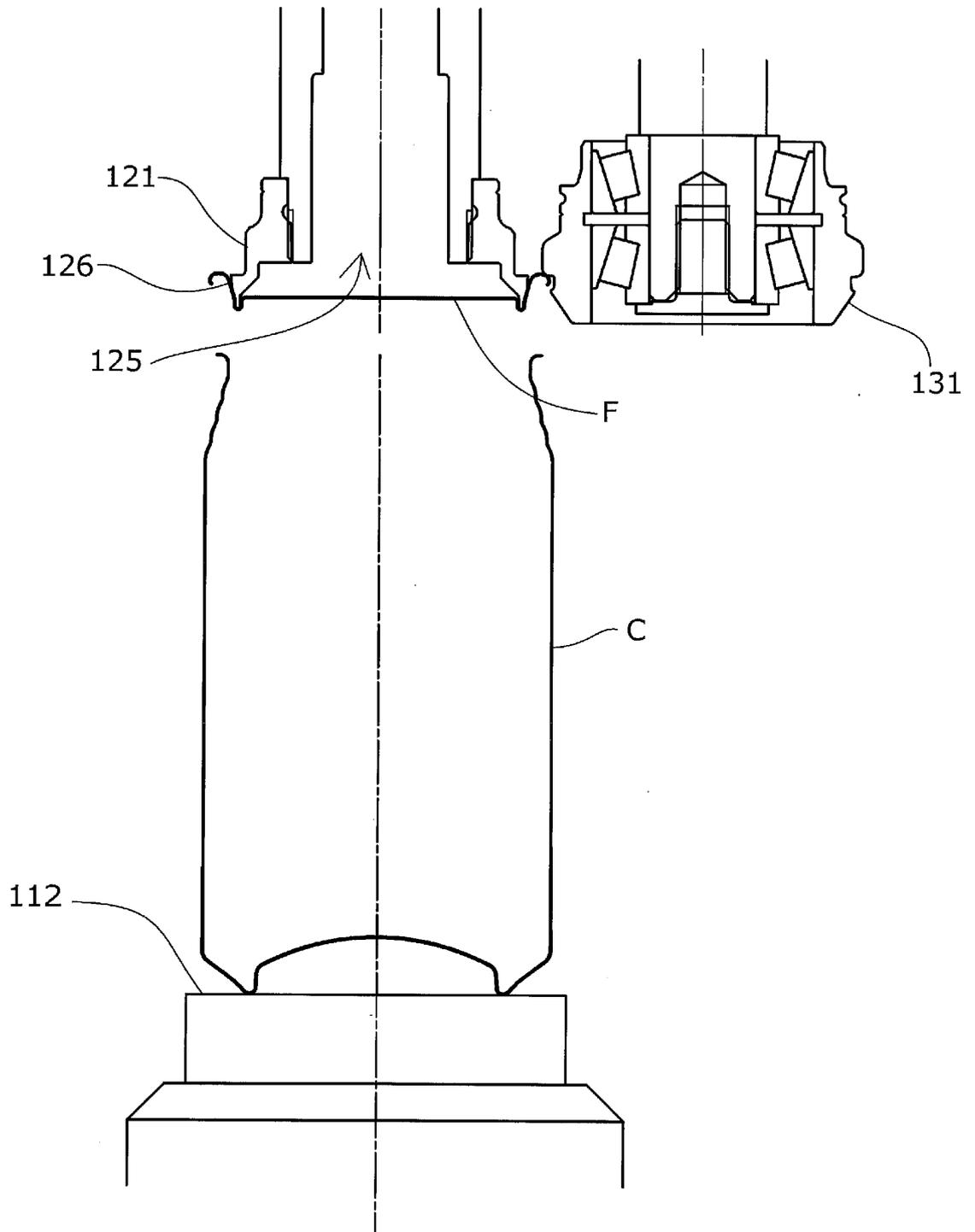


Fig. 6

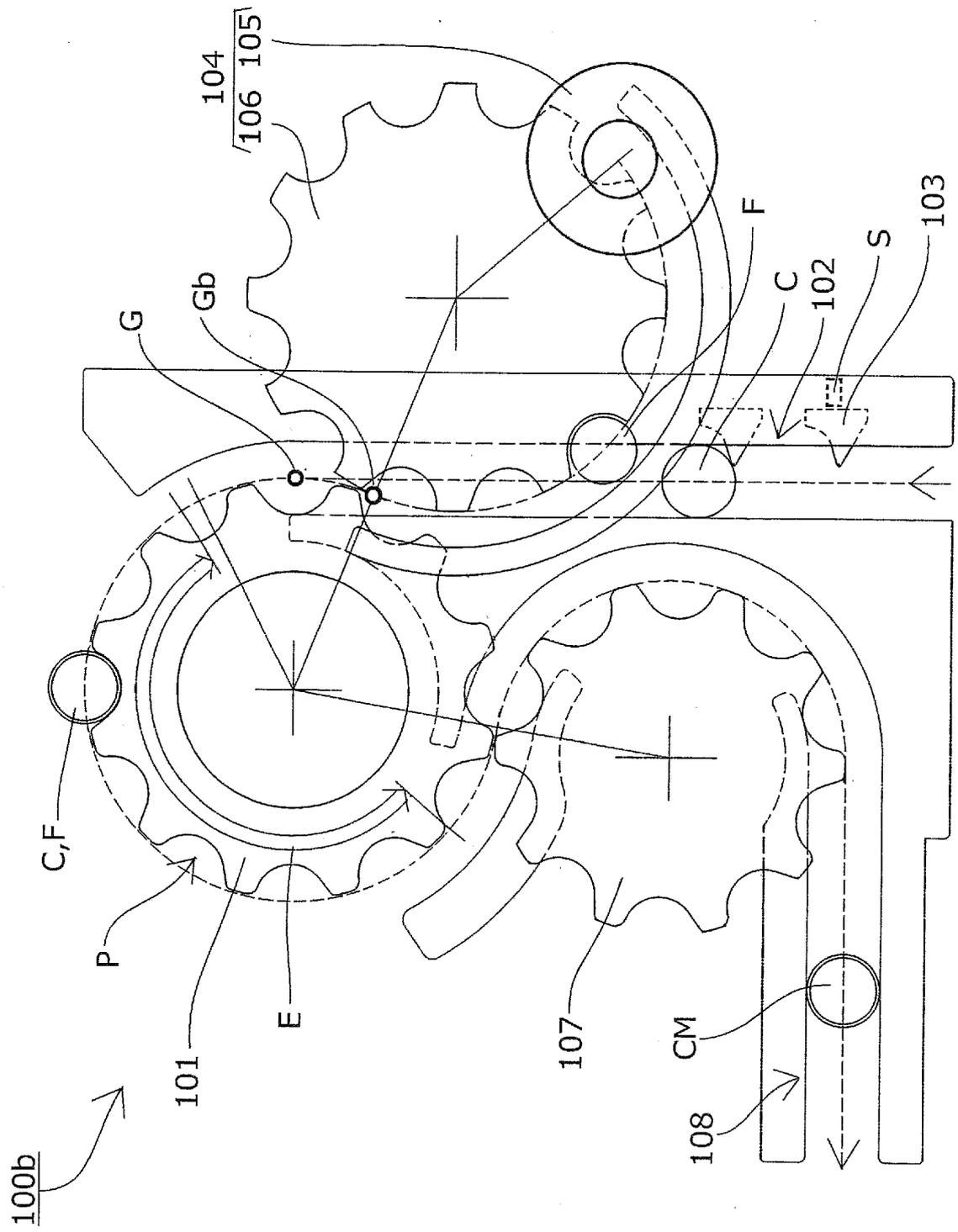


Fig. 7

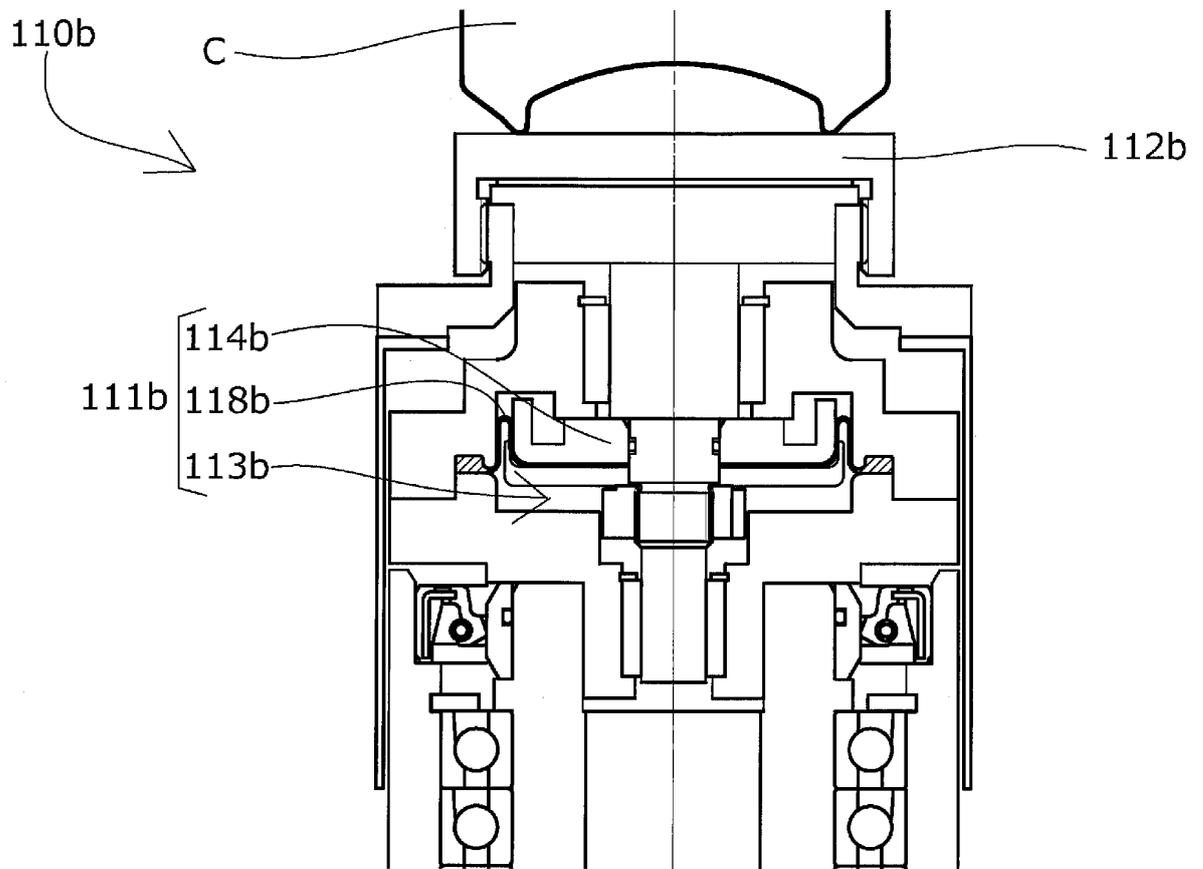


Fig. 8

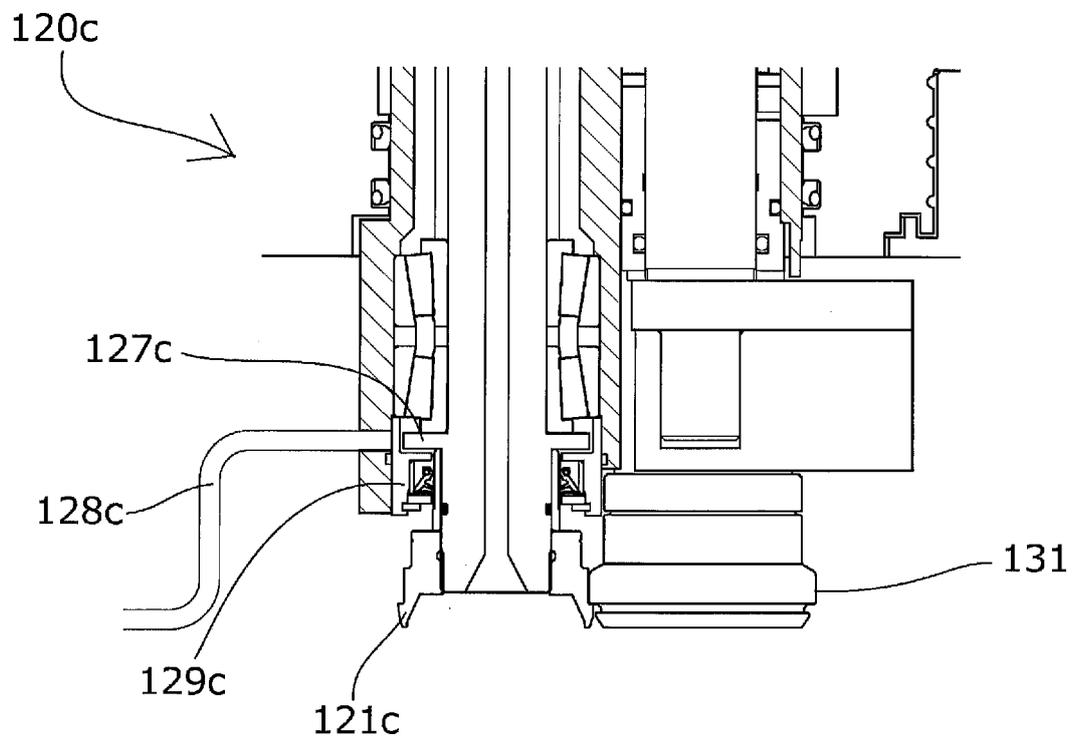
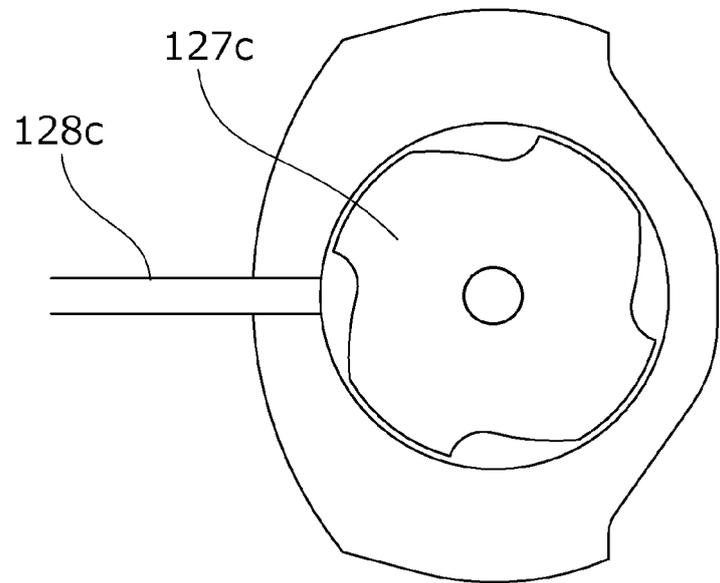


Fig. 9



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/066271

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## A. CLASSIFICATION OF SUBJECT MATTER

B21D51/30(2006.01) i

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

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## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B21D51/30

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016

Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

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

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2009-220178 A (Universal Can Corp.), 01 October 2009 (01.10.2009), paragraphs [0025] to [0052]; fig. 1 to 5 (Family: none)	1-8, 10 9, 11
Y A	JP 63-5833 A (Toyo Seikan Kaisha, Ltd.), 11 January 1988 (11.01.1988), page 1, lower right column, lines 12 to 20; page 2, upper right column, line 11 to lower left column, line 7 (Family: none)	1-8, 10 9, 11
Y A	JP 2001-259766 A (Kabushiki Kaisha Mitsuba Denyosha), 25 September 2001 (25.09.2001), claim 1 (Family: none)	4-8, 10 9, 11

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 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search  
22 August 2016 (22.08.16)Date of mailing of the international search report  
06 September 2016 (06.09.16)

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2007-14982 A (Niisato Kiko Kabushiki Kaisha), 25 January 2007 (25.01.2007), paragraphs [0018] to [0034] (Family: none)	4-8,10 9,11
Y A	JP 62-187530 A (Toyo Seikan Kaisha, Ltd.), 15 August 1987 (15.08.1987), claim 1 (Family: none)	5-8,10 9,11
Y A	JP 64-18540 A (Toyo Seikan Kaisha, Ltd.), 23 January 1989 (23.01.1989), page 3, upper right column, lines 10 to 13 (Family: none)	6-8,10 9,11

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**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- JP S62244537 B [0007]