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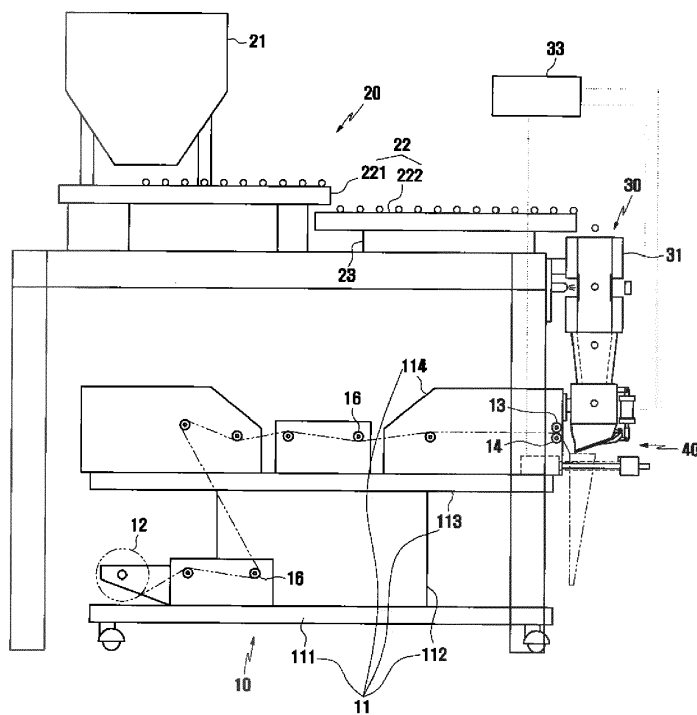
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(54) **AUTOMATIC PILL COUNTING AND PACKAGING APPARATUS**

(57) The present invention relates to an automatic pill counting and packaging apparatus which may automatically count and package pills into a pouch having a sealable inlet. The automatic pill counting and packaging apparatus includes a bottom transfer part (10) for supplying a pouch, a top transfer part (20) disposed at an

upper portion of the bottom transfer part (10) for supplying pills, a counting part (30) for counting the pills supplied by the top transfer part (20), and a packing part (40) for inputting and packing the pills supplied by the top transfer part (20) into the pouch supplied by the bottom transfer part (10).

[Fig 1]



Description

1. Field of the Invention

[0001] The present invention relates to an automatic pill counting and packaging apparatus capable of automatically performing a series of processes for providing pills and pouches, counting the pills, and inputting the pills into the pouches for packaging.

2. Discussion of Related Art

[0002] Generally, a typical pill counting and packaging technique includes a supplier for simultaneously supplying a plurality of pills; a transfer unit including an upper transfer device, which is connected to the supplier, having a plurality of main tracks arranged in parallel in a transverse direction so as to transfer the plurality of pills supplied from the supplier through paths different from each other, a first lower transfer device having a plurality of first sub-tracks, each of which has an upper portion connected to a lower portion of each of the main tracks and a plurality of first guide rails arranged in parallel in the transverse direction so as to transfer the plurality of pills supplied from the main tracks by dividing the pills into paths different from each other, and a second lower transfer device having a plurality of second sub-tracks, each of which has an upper portion connected to a lower portion of each of the first sub-tracks and a plurality of second guide rails formed therein corresponding to the first guide rails; and a discharger for discharging the pills, which are supplied from the transfer unit along the paths different from each other, through paths different from each other. Here, the supplier is formed of a hollow, an internal lower portion of the supplier is formed of a hollow and a supply hopper divided into a plurality of spaces so as to correspond to the number of the main tracks, an upper portion of the supplier is connected to a lower portion of the supply hopper, and a lower portion of the supplier is connected to each of the main tracks, wherein the supplier includes a connection hopper having an inside divided into a plurality of spaces so as to correspond to the supply hopper.

SUMMARY OF THE INVENTION

[0003] Therefore, an object of the present invention is to provide an automatic pill counting and packaging apparatus provided with a sequence of an automatic processing system for counting pills which are supplied, inputting a target number of the pills into a pouch, and simultaneously closing an inlet of the pouch and sealing the inlet when the inputting is completed, then separating and discharging the pouch from a pouch roll.

[0004] In order to achieve the above object, in accordance with the present invention, an automatic pill counting and packaging apparatus includes a bottom transfer part configured to supply a pouch; a top transfer part

disposed at an upper portion of the bottom transfer part and configured to supply pills; a counting part configured to count the pills supplied by the top transfer part; and a packing part configured to input and pack the pills supplied by the top transfer part into the pouch supplied by the bottom transfer part, wherein the bottom transfer part includes a bottom body; a store roller installed at a lower portion of a rear side of the bottom body and wound with a pouch roll in which sheets of pouches are connected in a row; upper and lower transfer rollers installed at an upper portion of a front side of the bottom body and configured to vertically support the pouch; and a transfer roller drive unit configured to deliver a rotational power to the upper transfer roller or the lower transfer roller to release the pouch roll wound on the store roller, thereby providing and transferring the pouch to the front side of the bottom body, and wherein the packing part includes a blowing unit installed at an upper portion of the upper transfer roller on a front surface of the bottom body and configured to open an inlet of a sheet of the pouch supplied by the bottom transfer part; a relay unit having a relay hopper configured to provide a pill input path from the top transfer part to the pouch, a shutter plate rotatably provided at an outlet of the relay hopper, and a plate drive unit configured to rotate the shutter plate to control an opening and a closing of the outlet of the relay hopper; and a sealing unit disposed at a lower portion of the lower transfer roller on the front surface of the bottom body and configured to heat and seal the inlet of the pouch.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing exemplary embodiments thereof in detail with reference to the accompanying drawings, in which:

FIG. 1 is a side configurational view illustrating an automatic pill counting and packaging apparatus according to the present invention;

FIGS. 2 and 3 are partial side configurational views illustrating a counting part and a packing part, respectively;

FIG. 4 is a partial front configurational view illustrating a guide unit of the packing part; and

FIG. 5 is a partial front configuration view illustrating a sealing unit of the packing part.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0006] Hereinafter, preferred embodiments of the present invention will be described with reference to the accompanying drawings.

[0007] Prior to describing the preferred embodiments of the present invention, terms or words used in this disclosure and claims are not to be construed by limiting to

ordinary or dictionary meanings, and these should be construed as meanings and concepts meeting the technical spirit of the present invention on the principle that inventors may appropriately define concepts of terms in order to describe their own invention in the best possible way. Therefore, embodiments disclosed herein and configurations shown in the accompanying drawings may be merely a single preferred embodiment and may not represent all technical spirits of the present invention, and it should be understood that numerous other equivalents and modifications may exist and may be devised by those skilled in the art at the time of applying this application.

[0008] On the basis of FIG. 1, a direction to a top transfer part is specified as an upper portion or an upper side and a direction to a bottom transfer part is specified as a lower portion or a lower side, whereas a direction to a store roller of the bottom transfer part is specified as a rear portion or a rear side and a direction to the upper and lower transfer rollers is specified as a front portion or a front side.

[0009] As shown in FIGS. 1 to 5, an automatic pill counting and packaging apparatus schematically include a bottom transfer part 10, a top transfer part 20, a counting part 30, and a packing part 40.

[0010] Looking at each component, as shown in FIG. 1, the bottom transfer part 10 is for supplying a pouch 1, and may include a bottom body 11, a store roller 12 installed at a rear lower portion of the bottom body 11 and wound with a pouch roll in which sheets of pouches 1 are connected in a row, upper and lower transfer rollers 13 and 14 installed at a front upper portion of the bottom body 11 to vertically support the pouch 1, and a transfer roller drive unit 15 for delivering a rotational power to the upper transfer roller 13 or the lower transfer roller 14 to release the pouch roll wound on the store roller 12, thereby supplying and transferring the pouch to a front side.

[0011] Here, the bottom body 11 includes a bottom frame 111, a vertical frame 112 erected at one side of an upper portion of the bottom frame 111, and a horizontal frame 113 disposed at an upper portion of the vertical frame 112 on front and rear sides.

[0012] And, the store roller 12 is laterally and horizontally disposed at a rear side of the bottom frame 111 of the bottom body 11, and the upper and lower transfer rollers 13 and 14 are laterally and horizontally disposed to be vertically parallel at a front side of the horizontal frame 113 of the bottom body 11.

[0013] In addition, the bottom body 11 further includes a plurality of guide rollers 16 disposed at each of the frames 111, 112, and 113 to guide a transferring of the pouch 1. Moreover, the bottom body 11 further includes a front cover 114 disposed at the front side of the horizontal frame 113 to have a form covering some portions of the upper and lower transfer rollers 13 and 14 and the plurality of guide rollers 16.

[0014] As shown in FIG. 1, the top transfer part 20 is disposed at an upper portion of the bottom transfer part 10 to supply pills, and includes a main hopper 21, a trans-

fer plate 22 for receiving the pills provided from the main hopper 21, and a vibration unit 23 for vibrating the transfer plate 22 to transfer the pills to the front side.

[0015] Here, the transfer plate 22 includes a top transfer plate 221 disposed at a lower portion of an outlet of the main hopper 21, and a bottom transfer plate 222 on which a plurality of pill movement paths are formed by a partition wall and one end of which is disposed at a lower portion of a front side of the top transfer plate 221.

[0016] Additionally, the vibration unit 23 is disposed at a lower portion of the bottom transfer plate 222 to vertically vibrate the bottom transfer plate 222, and to this end it may be preferable to arrange the bottom transfer plate 222 to be inclined downward toward the front side.

The vibration unit 23 may include an eccentric cam supporting the lower portion of the bottom transfer plate 222, and a cam driver for rotating the eccentric cam. Therefore, the vibration unit 23 may be modified and changed in a variety of forms within the range which satisfies conditions for vertically vibrating the bottom transfer plate 222.

[0017] As shown in FIGS. 2 and 3, the counting part 30 is for controlling an operation of the packing part 40 by counting the pills supplied by the top transfer part 20.

The counting part 30 includes a pill input pipe 31 having a penetrated portion at a middle thereof and first and second transparent plates 311 and 312 installed at the penetrated portion to enable pills dropping from the transfer plate 22 by the vibration unit 23 to be input into the pill input pipe 31; a photo-coupler 32 having a light emitting diode 321 installed outside the first transparent plate 311 to emit light and a light receiving transistor 322 installed outside the second transparent plate 312 to output an electrical signal in response to the light emitted from the light emitting diode 321; and a controller 33 for counting the pills input into the pill input pipe 31 in response to the electrical signal provided from the light receiving transistor 322 and controlling each unit of the vibration unit 23 and the packing part 40 to be described below to input the pills into the pouch 1 to a target value, wherein the controller 33 resumes counting the pills continuing a previous count of the pills when the counting of the pills has been stopped and then is restarted.

[0018] As shown in FIGS. 1 to 5, the packing part 40 is for inputting and packaging the pills supplied by the top transfer part 20 into the pouch 1 supplied by the bottom transfer part 10. The packing part 40 includes a blowing unit 41 installed at an upper portion of the upper transfer roller 13 on a front surface of the bottom body 11, that is, on a front surface of the front cover 114 of the bottom body 11, for opening an inlet of a sheet of the pouch 1 supplied by the bottom transfer part 10; a relay unit 42 having a relay hopper 421 providing a pill input path from the top transfer part 20 to the pouch 1, a shutter plate 422 rotatably provided at an outlet of the relay hopper 421, and a plate drive unit 423 for rotating the shutter plate 422 to control an opening and a closing of the outlet of the relay hopper 421; a sealing unit 43 disposed at a

lower portion of the lower transfer roller 14 on the front surface of the bottom body 11, that is, on the front surface of the front cover 114 of the bottom body 11, and provided with a heating bar 433 for heating and sealing the inlet of the pouch 1.

[0019] As shown in FIGS. 3 and 4, the blowing unit 41 includes a nozzle 411 fixed to and installed at a separate bracket and the like provided on the front surface of the front cover 114, and an air supply unit 412 connected to the nozzle 411 to supply air under the control of the controller 33.

[0020] Here, a nozzle 411 having a downward discharge type structure so as to discharge air into the inlet of the pouch 1 located at a lower side thereof is preferable.

[0021] In addition, as shown in FIGS. 2 and 3, the relay unit 42 further includes a collection hopper 424 for collecting the dropped pills, which pass from the bottom transfer plate 222 of the top transfer part 20 to the pill input pipe 31, to guide the collected pills to move to the relay hopper 421.

[0022] Moreover, as shown in FIGS. 2 and 3, the plate drive unit 423 of the relay unit 42 includes a supporting bar 423a provided at an upper portion of a front side of the relay hopper 421; a known pneumatic cylinder 423b provided with a cylinder body 423b1 and a piston 423b2 installed therein, which are hinge-coupled to the supporting bar 423a, and enabling the piston 423b2 to perform a forward and backward movement according to a selective supply of air; a first hinge 423c mutually connecting an end of the piston 423b2 of the pneumatic cylinder 423b and a middle end of a front surface of the shutter plate 422; and a second hinge 423d mutually connecting an upper portion of the shutter plate 422 and a lower portion of the front side of the relay hopper 421.

[0023] With such a configuration, opening and closing operations of the shutter plate 422 may be possible based on the second hinge 423d by the forward and backward movement of the piston 423b2 of the pneumatic cylinder 423b. At this point, a lower portion surface of the outlet of the relay hopper 421 has a structure which is inclined from the front side more as it nears the rear side, and the shutter plate 422 has a size capable of blocking the outlet of the relay hopper 421. When the pills are input into the inlet of the pouch 1, the shutter plate 422, which is rotated to be opened by the plate drive unit 423, having a rotational angle so as to support an inward side of the inlet of the pouch 1 toward an outward direction thereof may be preferable.

[0024] As a result, the opened outlet of the pouch 1 may be supported by the shutter plate 422, which is rotated to be opened, to maintain an open state.

[0025] In addition, as shown in FIGS. 2, 3, and 5, the sealing unit 43 includes two guide poles 431 longitudinally and horizontally disposed at both ends of the front surface of the front cover 114 of the bottom body 11; a sealing body 432 inserted into the two guide poles 431; the heating bar 433 provided horizontally on a rear sur-

face of the sealing body 432; and a sealing drive unit 434 for moving the sealing body 432 forward and backward along the two guide poles 431, and which is controlled by the controller 33. At this point, the sealing drive unit 434 is fixed to and installed at the horizontal frame 113 of the bottom body 11 and an end of the built-in piston 423b2 is connected to the sealing body 432, wherein the sealing drive unit 434 may be connected to the sealing body 432 without interfering with the pouch 1 into which the pills are input, and may include a known pneumatic cylinder capable of moving the sealing body 432 in forward and backward directions according to a selective supply of air. Therefore, the sealing drive unit 434 may be modified and changed in a variety of forms within the range satisfying conditions for moving the sealing body 432 in forward and backward directions.

[0026] As a result, when the inputting of the pills into the inlet of the pouch 1 is completed, the heating bar 433 positioned at the rear surface of the sealing body 432, which is advanced by the sealing drive unit 434, heats and seals the inlet of the pouch 1.

[0027] In addition, the packing part 40 further includes a guide unit 44 pushing both ends of the inward side of the inlet of the pouch 1 to induce a closing of the inlet of the pouch 1 when being sealed by the sealing unit 43 after the inputting of the pills into the inlet of the pouch 1 is completed. As shown in FIGS. 4 and 5, the guide unit 44 includes a guide cylinder 441 of a pneumatic cylinder structure provided at one side of the upper transfer roller 13 in the front cover 114 of the bottom body 11; a guide piston 442 installed in the guide cylinder 441 and performing a reciprocating movement in left and right directions according to a selective supply of air; a guide pushrod 443 of a backslash '\ ' shape hinge-coupled to an end of the guide piston 442 and having a long hole formed at a middle portion of the guide pushrod 443 in a length direction; and a guide pin 444 provided at the guide cylinder 441 and fitted in the long hole of the guide pushrod 443. With such a configuration, when the guide piston 442 advances, the guide pushrod 443 simultaneously advances with the advancing of the guide piston 442 to perform a rotational operation based on the guide pin 444. At this point, the guide pushrod 443 being vertically erected pushes the inward side of the inlet of the pouch 1 toward an outward direction thereof.

[0028] Moreover, a guide unit 44 is further provided at the other side of the upper transfer roller 13 in the front cover 114 of the bottom body 11, wherein the two guide units 44 are provided in a structure facing each other such that the both ends of the inward side of the inlet of the pouch 1 are pushed toward the outward direction thereof to induce a closing of the inlet of the pouch 1.

[0029] Meanwhile, when the inlet of the pouch 1 is sealed by the sealing unit 43, the upper or lower transfer roller 13 or 14 is rotated in reverse by the transfer roller drive unit 15 to separate and drop a sheet of the pouch 1 from the pouch roll when the heating bar 433 of the sealing unit 43 pressurizes and fixes the inlet of the pouch

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[0030] Looking at an operation of the automatic pill counting and packaging apparatus with such a configuration, pills accommodating in the main hopper 21 of the top transfer part 20 are transferred to the bottom transfer plate 222 after passing the top transfer plate 221 of the transfer plate 22; the bottom transfer plate 222 being vertically vibrated by the vibration unit 23 transfers the pills to a front side; the photo-coupler 32 counts the pills passing through the pill input pipe 31; the controller 33 controls the plate drive unit 423 based on the counted value to rotate the shutter plate 422, thereby closing the outlet of the relay hopper 421; and the controller 33 simultaneously controls the sealing drive unit 434 to move the sealing body 432 backward such that the heating bar 433 positioned at the rear side of the sealing body 432 heats and seals the inlet of the pouch 1 and simultaneously pressurizes the inlet. The controller 33 simultaneously controls the guide cylinder 441 to advance the guide piston 442 such that the guide pushrod 443 connected to the guide piston 442 is rotated based on the guide pin 444 to be vertically erected and to close the inlet of the pouch 1. At this point, a rotational operation of the guide pushrod 443 is completed before the sealing body 432 begins a backward movement operation and the heating bar 433 reaches the inlet of the pouch 1, that is, before pressurizing the inlet.

[0031] After the sealing is completed, the controller 33 controls the transfer roller drive unit 15 to rotate the upper or lower transfer roller 13 or 14 in reverse to separate the sheet of the pouch 1 from the pouch roll, and then the guide pushrod 443 and the sealing body 432 are respectively restored to their original positions. Also, the controller 33 controls the transfer roller drive unit 15 to rotate the upper or lower transfer roller 13 or 14 to provide a sheet of the pouch 1 to the front side. In addition, the controller 33 controls an air supply unit 412 to open an inlet of the pouch 1 using air discharged from the nozzle 411 at the same time as opening the outlet of the relay hopper 421 through the shutter plate 422, thereby restarting an input of the pills into a newly supplied pouch 1.

[0032] At this point, when the outlet of the relay hopper 421 is closed by the shutter plate 422, the pills supplied to the relay hopper 421, which have been counted by the counting part 30, and the controller 33 reflects the counted value of the pills when restarting the input of the pills into the newly supplied pouch 1, thereby an input of a target value of pills is performed.

[0033] In accordance with the present invention, a primary effect of the automatic pill counting and packaging apparatus may be the possibility of packaging pills in a vinyl type pouch instead of a typical vessel used in pill packing.

[0034] Also, in accordance with the present invention, when pills are packed in a pouch, each process for opening and fixing an inlet of the pouch, closing and sealing the inlet of the pouch, discharge the pouch, and the like may be automatically performed in the packing part.

[0035] Although the present invention has been described above with reference to the accompanying drawings by focusing on "the automatic pill counting and packaging apparatus" having an inventive form and structure, numerous other modifications and alternations can be devised by those skilled in the art and these should be construed as falling within the spirit and scope of the principles of the present invention.

Claims

1. An automatic pill counting and packaging apparatus comprising:

a bottom transfer part configured to supply a pouch;
a top transfer part disposed at an upper portion of the bottom transfer part and configured to supply pills;
a counting part configured to count the pills supplied by the top transfer part; and
a packing part configured to input and pack the pills supplied by the top transfer part into the pouch supplied by the bottom transfer part,

wherein the bottom transfer part includes:

a bottom body;
a store roller installed at a lower portion of a rear side of the bottom body and wound with a pouch roll in which sheets of pouches are connected in a row;
upper and lower transfer rollers installed at an upper portion of a front side of the bottom body and configured to vertically support the pouch; and
a transfer roller drive unit configured to deliver a rotational power to the upper transfer roller or the lower transfer roller to release the pouch roll wound on the store roller, thereby providing and transferring the pouch to the front side, and

wherein the packing part includes:

a blowing unit installed at an upper portion of the upper transfer roller in a front surface of the bottom body so as to opening an inlet of a sheet of the pouch supplied by the bottom transfer part;
a relay unit having a relay hopper configured to provide a pill input path from the top transfer part to the pouch, a shutter plate rotatably provided at an outlet of the relay hopper, and a plate drive unit configured to rotate the shutter plate to control an opening and a closing of the outlet of the relay hopper; and
a sealing unit disposed at a lower portion of the

lower transfer roller in the front surface of the bottom body and having a heating bar to heat and seal the inlet of the pouch.

2. The apparatus of claim 1, wherein, the shutter plate which rotated by the plate drive unit, when the pills are input into the inlet of the pouch, has a rotational angle so as to support an inward side of the inlet of the pouch toward an outward direction thereof.

3. The apparatus of claim 1, wherein the packing part further includes:

a guide unit configured to bidirectionally push both ends of the inward side of the inlet of the pouch to induce a closing of the inlet of the pouch when the inputting of the pills into the inlet of the pouch has been completed and the inlet of the pouch is sealed by the sealing unit.

4. The apparatus of claim 1, wherein the pouch is fixed by the heating bar of the sealing unit when the inlet of the pouch is sealed by the sealing unit, and the upper or lower transfer roller is rotated in reverse by the transfer roller drive unit to separate the sheet of the pouch from the pouch roll.

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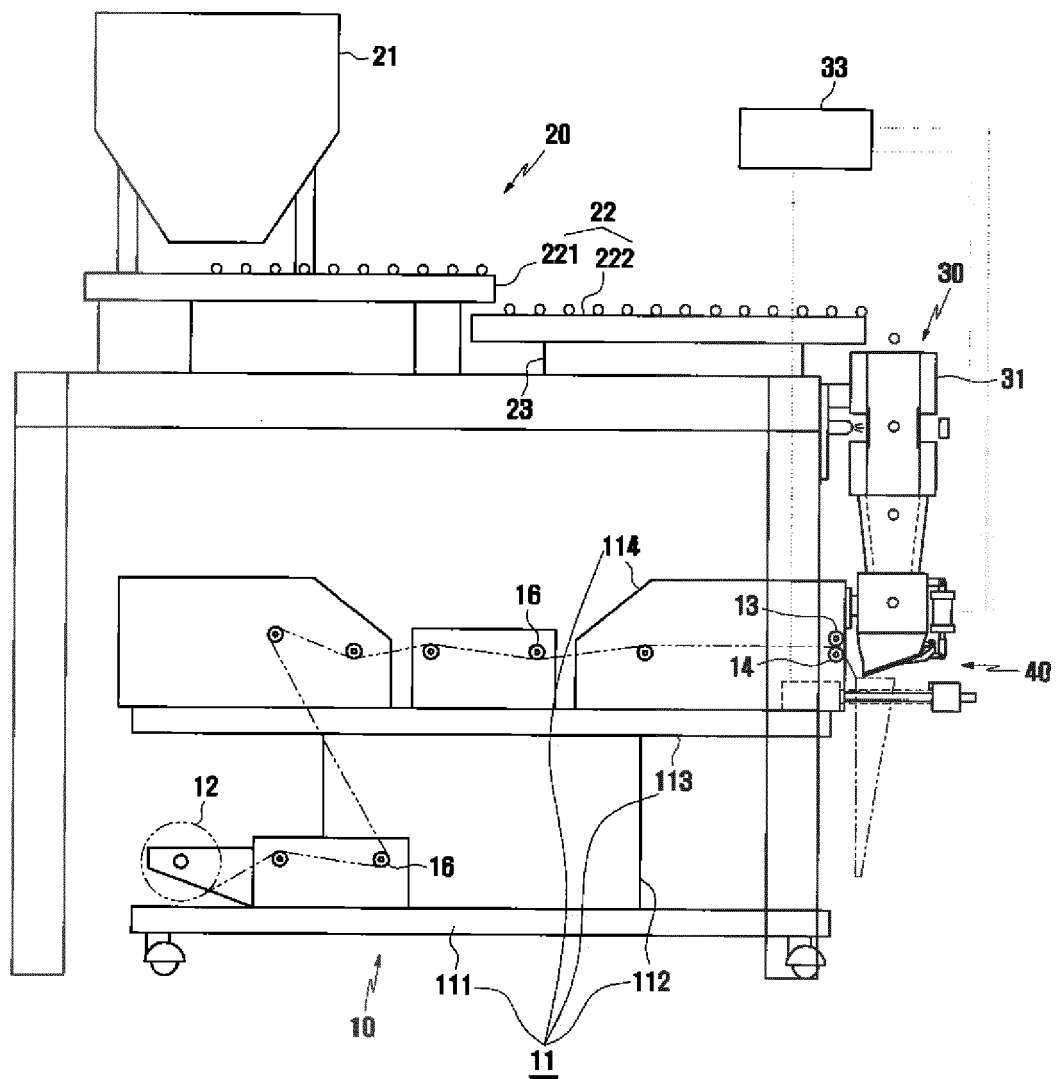
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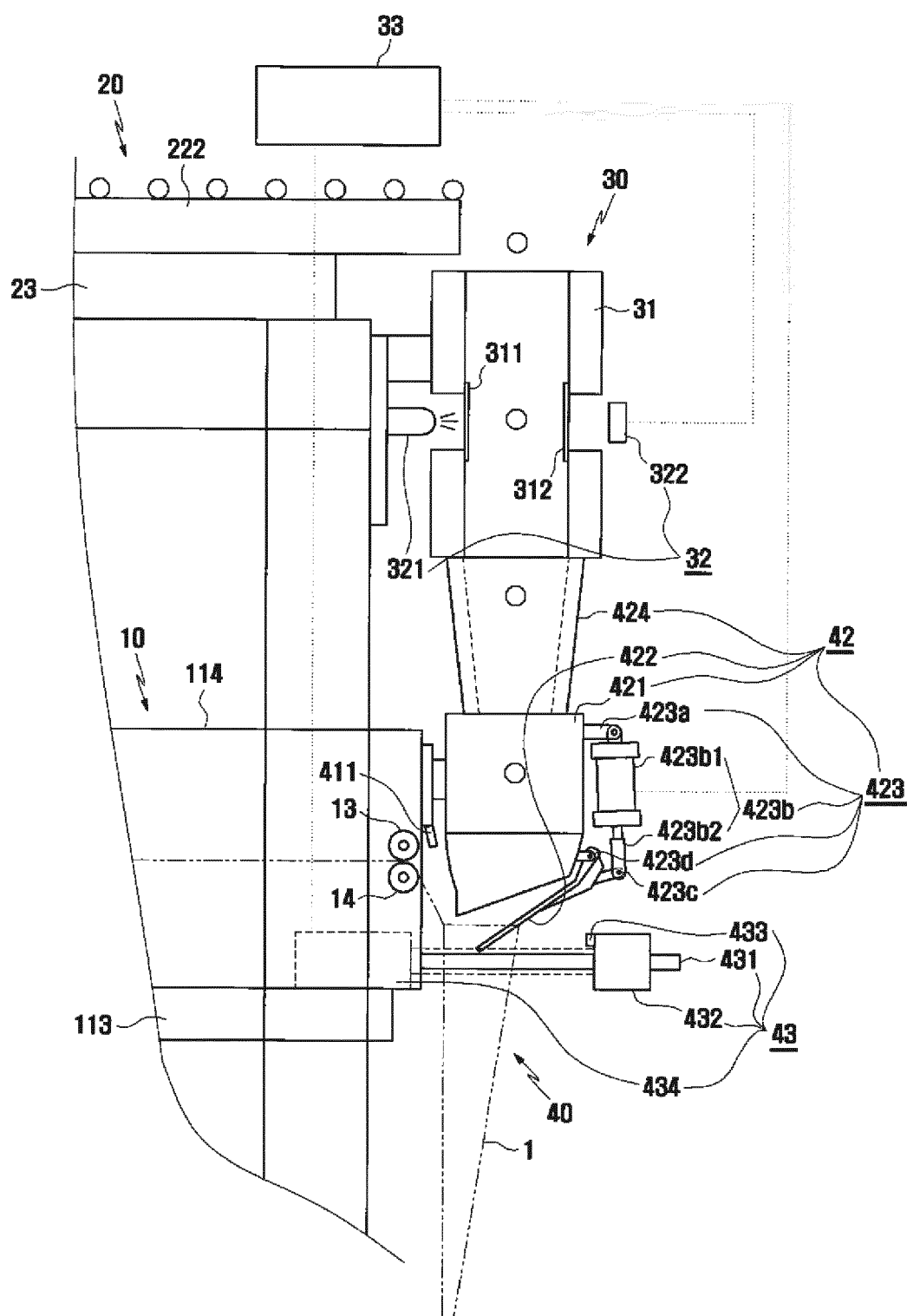
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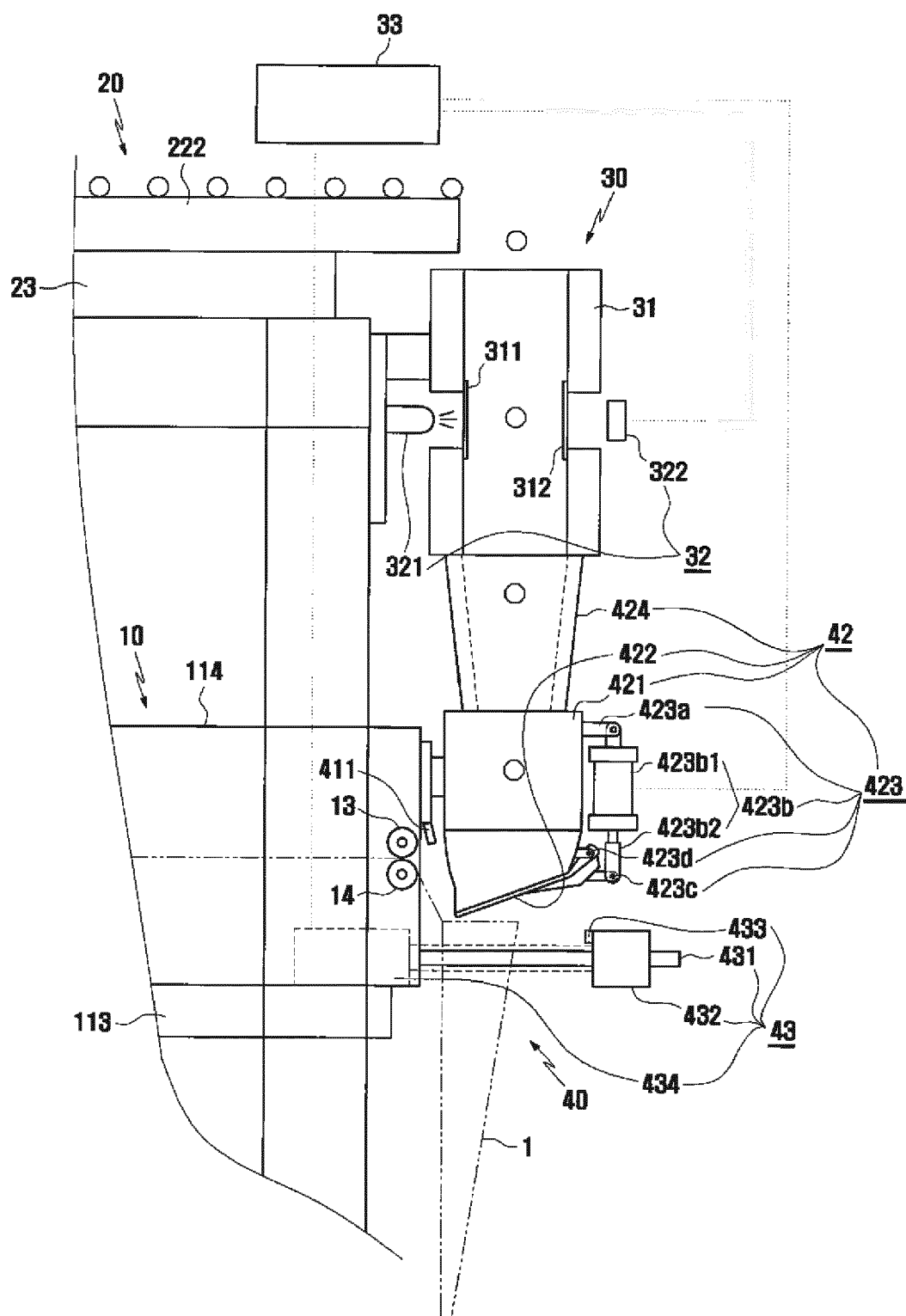
[Fig 1]



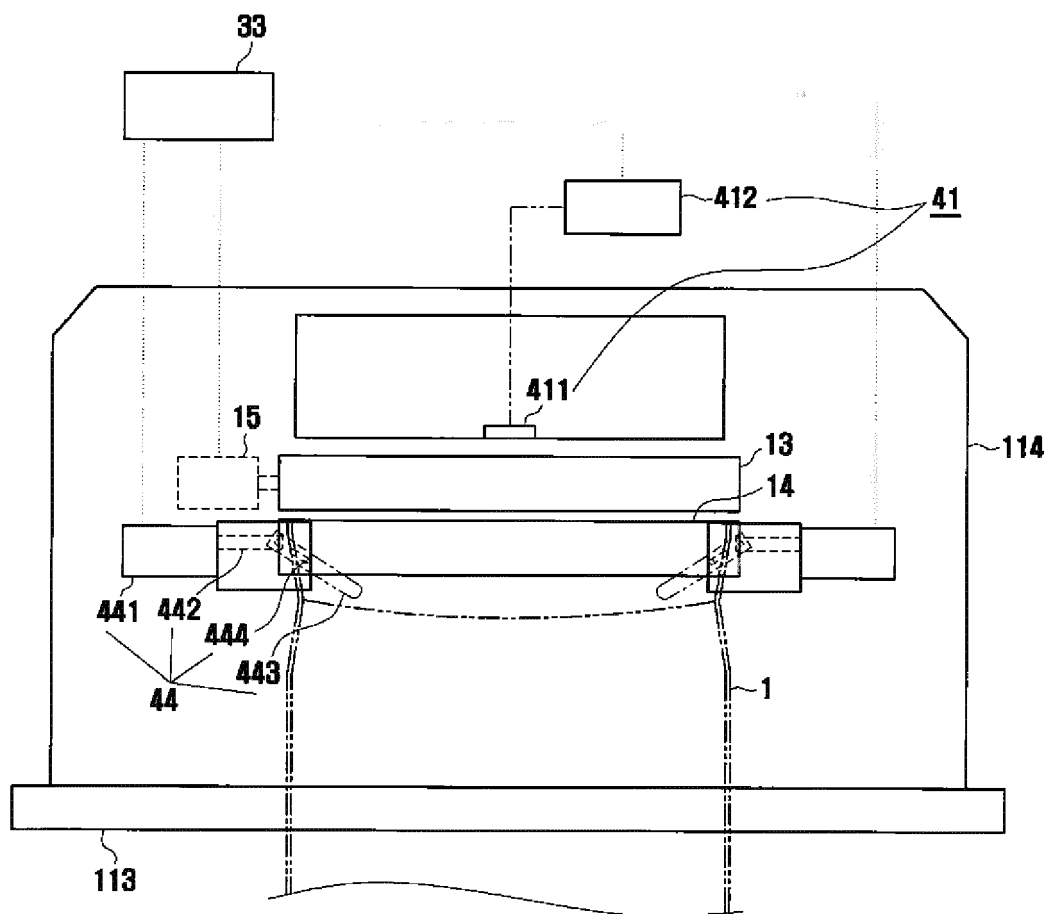
[Fig 2]



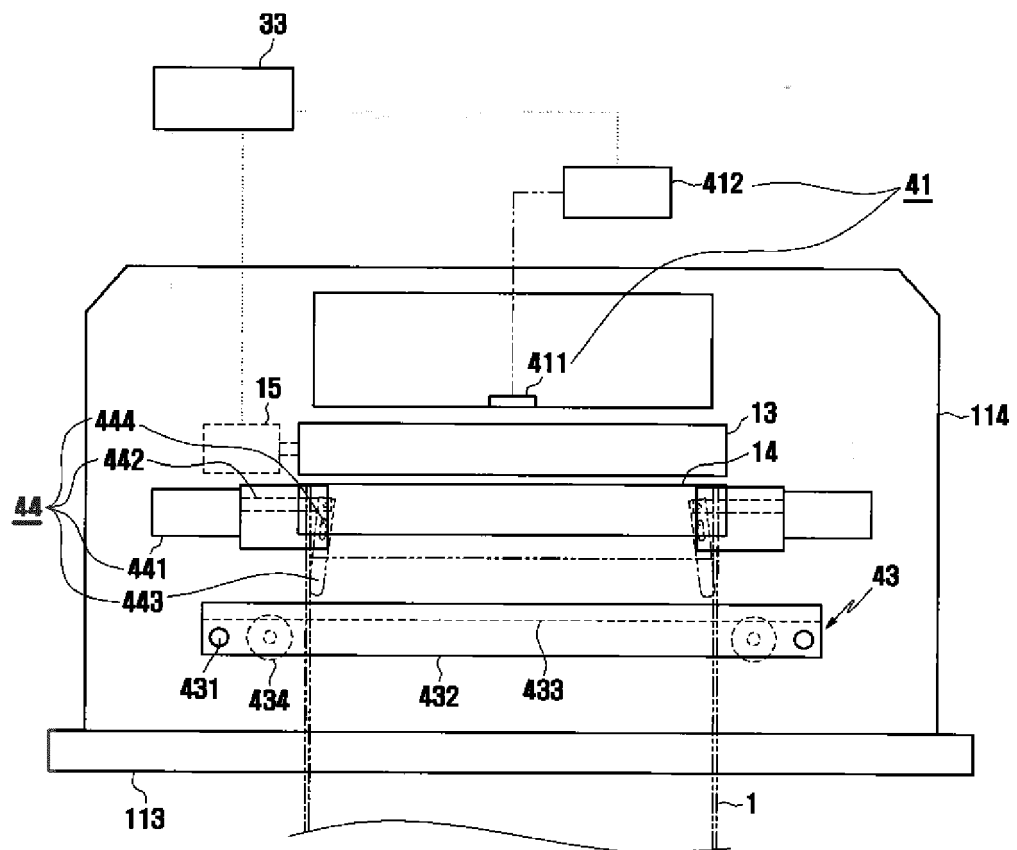
[Fig 3]



[Fig 4]



[Fig 5]





EUROPEAN SEARCH REPORT

Application Number
EP 16 19 2551

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 2004/098950 A1 (KIM HO YEON [KR] ET AL) 27 May 2004 (2004-05-27) * paragraph [0016] - paragraph [0028]; figure 1 *	1,2	INV. B65B5/10 B65B39/00 B65B41/16 B65B43/12
Y	US 2006/005553 A1 (METZGER MARK C [US]) 12 January 2006 (2006-01-12) * paragraph [0041] - paragraph [0048]; figures 4,5 *	1,2	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65B
~~The present search report has been drawn up for all claims~~			
Place of search		Date of completion of the search	Examiner
Munich		24 March 2017	Vesterholm, Mika
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)



Application Number

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1, 2

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

EP 16 19 2551

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1, 2

How to enable filling of a pouch.

2. claims: 3, 4

How to seal a pouch

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-03-2017

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82