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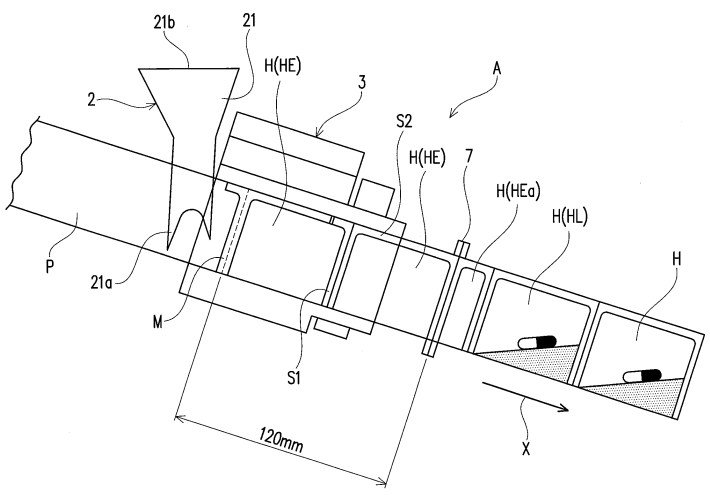
(54) DRUG DIVIDING AND PACKAGING DEVICE

(57) Provided is a medicine dispensing and packing apparatus including a sheet feeding apparatus, a medicine putting unit, a sealing apparatus, and a control unit. The control unit controls the sheet feeding apparatus and the sealing apparatus to pack medicine. A plurality of packets formed by the sheet feeding apparatus and the sealing apparatus include a plurality of medicine-containing packets and a plurality of empty packets in which the medicine is not packed. The control unit controls the sheet feeding apparatus and the sealing apparatus to: form the plurality of empty packets upstream of the plurality of medicine-containing packets in the feeding direction; and form at least one empty packet of the plurality of empty packets such that the lengthwise size thereof is smaller than that of each of the plurality of medicine-containing packets.

FIG. 3



EP 2 853 496 A1

Description

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority to Japanese Patent Application No. 2012-117385, the disclosure of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] The present invention relates to a medicine dispensing and packing apparatus that puts medicine into an elongated packing sheet being fed, seals the packing sheet, and forms a packet.

RELATED ART

[0003] A medicine dispensing and packing apparatus that forms a packet in which medicine is packed is widely used (see, for example, Patent Literature 1). The medicine dispensing and packing apparatus includes: a sheet feeding apparatus that feeds an elongated packing sheet having an open end formed in a lengthwise direction thereof; a medicine putting unit that puts medicine into the packing sheet; and a sealing apparatus that seals the packing sheet and forms individually divided packets.

[0004] The medicine dispensing and packing apparatus forms empty packets that are packets in which the medicine is not put, after the end of a series of medicine packing steps. A user of the medicine dispensing and packing apparatus can cut off the packing sheet in this empty packet portion. For this cut-off, the medicine dispensing and packing apparatus includes a cut-off blade unit that is provided so as to face a feeding path of the packing sheet.

[0005] The lengthwise size of each empty packet formed by the medicine dispensing and packing apparatus is the same as that of each medicine-containing packet on which the series of packing steps has been performed (note that, when a subsequent series of packing steps is performed after the series of packing steps, the lengthwise size of each packet formed in the subsequent series of packing steps can be changed). Here, in a zone from the seal formation position of the sealing apparatus to the position of the cut-off blade unit, the medicine cannot be put until the subsequent series of packing steps is performed after the end of the series of packing steps. Accordingly, because of the structure of the medicine dispensing and packing apparatus, packets in the zone are always formed as empty packets.

[0006] For example, it is assumed that the distance from the seal formation position to the cut-off blade unit is 120 mm. Under this assumption, in the case where the lengthwise size of each packet is 60 mm, for example, as illustrated in FIG. 6A, empty packets HE are formed to have a lengthwise size of 180 mm, which corresponds to three packets. (Note that the reason why the empty packets HE are not formed to have a lengthwise size of 120 mm, which corresponds to two packets is that, if the empty packets HE are formed to have a lengthwise size of 120 mm, the packing sheet is cut off immediately after a last medicine-containing packet HL, and the last packet HL may be torn(the medicine may fall out). That is, the length (60 mm) corresponding to one packet adjacent to the last packet HL is a size for allowance.) In the case where the lengthwise size thereof is 80 mm, as illustrated in FIG. 6B, the empty packets HE are formed to have a lengthwise size of 160 mm, which corresponds to two packets. In the case where the lengthwise size thereof is 90 mm, as illustrated in FIG. 6C, the empty packets HE are formed to have a lengthwise size of 180 mm, which corresponds to two packets.

[0007] From the above description, on the basis of the distance (120 mm) from the seal formation position to the cut-off blade unit, in the case where the lengthwise size of each packet is 60 mm, a portion of the packing sheet corresponding to 60 mm is an extra (180 mm - 120 mm). In the case where the lengthwise size thereof is 80 mm, a portion of the packing sheet corresponding to 40 mm is an extra (160 mm - 120 mm). In the case where the lengthwise size thereof is 90 mm, a portion of the packing sheet corresponding to 60 mm is an extra (180 mm - 120 mm). Because the medicine is not put into the empty packets, there is no choice but to discard the extra portion of the packing sheet after its cut-off, which is wasteful.

CITATION LIST

Patent Literature

[0008] Patent Literature 1: JP 2005-212886 A

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0009] In view of the above, the present invention has an object to provide a medicine dispensing and packing apparatus capable of suppressing a waste of a packing sheet.

MEANS FOR SOLVING PROBLEMS

[0010] The present invention provides a medicine dispensing and packing apparatus including: a sheet feeding apparatus that feeds an elongated packing sheet in a lengthwise direction thereof, the packing sheet having an open end formed in the lengthwise direction; a medicine putting unit including a medicine putting port that is located in a space in the packing sheet through the open end, the medicine putting unit putting medicine into the space in the packing sheet from the medicine putting port; a sealing apparatus that seals the packing sheet; and a control unit that controls the sheet feeding apparatus and the sealing apparatus to form a plurality of in-

dividually divided packets. The plurality of packets include a plurality of medicine-containing packets and a plurality of empty packets in which the medicine is not packed. The control unit controls the sheet feeding apparatus and the sealing apparatus to: sequentially pack the medicine by sealing the packing sheet in which the medicine is put by the medicine putting unit; and thereby form the plurality of medicine-containing packets. The control unit further controls the sheet feeding apparatus and the sealing apparatus to: form the plurality of empty packets upstream of the plurality of medicine-containing packets in the packing sheet in a feeding direction of the packing sheet; and form at least one empty packet of the plurality of empty packets such that a lengthwise size thereof is smaller than that of each of the plurality of medicine-containing packets.

[0011] Moreover, the control unit may control the sheet feeding apparatus and the sealing apparatus to form the at least one empty packet adjacently to and further upstream of a medicine-containing packet in the feeding direction of the packing sheet, the medicine-containing packet being formed on the most upstream side in the feeding direction of the packing sheet, of the plurality of medicine-containing packets.

[0012] Moreover, the medicine dispensing and packing apparatus may further include: a perforation line forming unit that forms a perforation line in the packing sheet in a widthwise direction thereof; and a cut-off blade unit that is used by a user of the medicine dispensing and packing apparatus to cut off the plurality of medicine-containing packets downstream of the sealing apparatus in the feeding direction of the packing sheet. The control unit may control the perforation line forming unit to form the perforation line such that the perforation line matches in position with a sealed portion that extends in the widthwise direction on at least one of an upstream side and a downstream side of the at least one empty packet in the feeding direction of the packing sheet. The control unit may control the sheet feeding apparatus such that one of the formed perforation lines stops so as to match in position with the cut-off blade unit.

[0013] Moreover, the medicine dispensing and packing apparatus may further include: a perforation line forming unit that forms a perforation line in the packing sheet in a widthwise direction thereof; and a cut-off blade unit that is used by a user of the medicine dispensing and packing apparatus to cut off the plurality of medicine-containing packets downstream of the sealing apparatus in the feeding direction of the packing sheet. The control unit may control the sheet feeding apparatus and the sealing apparatus to variably adjust a seal interval in the lengthwise direction of the packing sheet. The control unit may further control the sheet feeding apparatus and the perforation line forming unit to form the perforation line further upstream of a medicine-containing packet in the feeding direction of the packing sheet, the medicine-containing packet being formed on the most upstream side in the feeding direction of the packing sheet, of the plurality of medicine-containing packets. The control unit may further control the sheet feeding apparatus such that one of the formed perforation lines stops so as to match in position with the cut-off blade unit, regardless of a lengthwise size of each of the plurality of medicine-containing packets.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a main part perspective view schematically illustrating a medicine packing apparatus in a medicine dispensing and packing apparatus according to an embodiment of the present invention.

FIG. 2 is a main part plan view schematically illustrating the medicine packing apparatus.

FIG. 3 is a main part front view schematically illustrating how to form packets by the medicine packing apparatus.

FIG. 4 is a main part plan view schematically illustrating how to form the packets by the medicine packing apparatus.

FIG. 5A is a main part front view schematically illustrating how to cut off a packing sheet by a cut-off blade unit in the medicine packing apparatus, the cut-off blade unit including a curved blade.

FIG. 5B is a main part front view schematically illustrating how to cut off the packing sheet by the cut-off blade unit in the medicine packing apparatus, the cut-off blade unit including a straight blade.

FIG. 6A is a main part plan view schematically illustrating how to form packets by a conventional medicine packing apparatus.

FIG. 6B is a main part plan view schematically illustrating how to form packets by a conventional medicine packing apparatus.

FIG. 6C is a main part plan view schematically illustrating how to form packets by a conventional medicine packing apparatus.

DESCRIPTION OF EMBODIMENTS

[0015] Next, the present invention is described by way of an embodiment. A medicine dispensing and packing apparatus of the present invention is provided in order to distribute and supply medicine. In the medicine dispensing and packing apparatus, for example, a medicine distributing and supplying apparatus (not illustrated) including distribution cells and a feeder selectively supplies medicine such as powders, tablets, and capsules of a type and an amount corresponding to a prescription, to a medicine packing apparatus A, and the medicine is packed as illustrated in FIG. 3.

[0016] As illustrated in FIG. 1 and FIG. 2, the medicine packing apparatus A includes a guide unit 1, a medicine putting unit 2, a heat sealing apparatus 3 as a sealing apparatus, and a sheet feeding apparatus 4. Moreover,

the medicine packing apparatus A includes a control unit CONT (see FIG. 2) that controls each unit of the medicine packing apparatus A.

[0017] In the medicine packing apparatus A, an elongated packing sheet P is pulled out from a roll Q, is guided by the guide unit 1, and is fed by the sheet feeding apparatus 4 in a lengthwise direction (an X direction in the drawings) thereof. Then, the medicine is put into the packing sheet P by the medicine putting unit 2. Then, the packing sheet P is heat-sealed by the heat sealing apparatus 3, and is automatically packed packet by packet, so that a plurality of individually divided packets H are formed as illustrated in FIG. 3.

[0018] In the roll Q, the elongated belt-shaped packing sheet P is folded in half in the lengthwise direction, and is rolled around a roll shaft R in the state where an open end Pa is formed in the lengthwise direction. The roll Q is rotatably provided to the medicine packing apparatus A. Examples of the packing sheet P forming the roll Q include glassine paper and resin sheets each including a heat-sealable resin film layer. Moreover, the edges on the open end Pa side of the packing sheet P may be subjected to a process for facilitating cutting, for example, forming fine irregularities.

[0019] The guide unit 1 includes guide rollers 11, 12. As illustrated in the drawings, the guide rollers 11, 12 are placed such that the axial directions thereof extend along the widthwise direction of the packing sheet P, and can guide the packing sheet P pulled out from the roll Q to the medicine putting unit 2.

[0020] Moreover, the guide unit 1 includes a triangular plate 14. The triangular plate 14 is located in a space in the packing sheet P folded in half. The width of the triangular plate 14 is larger than the width of a region in which the packing sheet P is fed, at the position of a medicine putting hopper 21 to be described later. The triangular plate 14 has a substantially triangular shape in plan view. The triangular plate 14 is located downstream of the guide roller 11 and upstream of the hopper 21 in the feeding direction X. The triangular plate 14 can open the open end Pa formed in the lengthwise direction of the packing sheet P guided by the guide roller 11, and can modify a deviation of the open end Pa of the packing sheet P at the time of sealing.

[0021] The medicine putting unit 2 includes the medicine putting hopper 21. The medicine putting hopper 21 receives a predetermined amount of medicine supplied by the medicine distributing and supplying apparatus, and puts the medicine into the space in the packing sheet P folded in half. The medicine putting hopper 21 includes: a medicine supply port 21b to which the medicine from the medicine distributing and supplying apparatus is supplied, at an upper end thereof; and a medicine putting port 21a for putting the supplied medicine into the packing sheet P, at a lower end thereof. The medicine putting port 21a of the hopper 21 is located in the space in the packing sheet P through the open end Pa of the packing sheet P opened by the triangular plate 14. With this configuration, the predetermined amount of medicine supplied to the medicine packing apparatus A is put into the packing sheet P without being scattered.

[0022] The heat sealing apparatus 3 heat-seals the packing sheet P fed by the sheet feeding apparatus 4. Consequently, the individually divided packets H are formed as illustrated in FIG. 3. As illustrated in FIG. 1 and FIG. 2, the heat sealing apparatus 3 includes: a pair of substantially L-shaped sealing units 30 each composed of a widthwise sealing unit 31 and a lengthwise sealing unit 32; and a seal driving unit 33 that is a driving unit that drives the pair of sealing units 30 and is connected to the control unit CONT. Moreover, the heat sealing apparatus 3 includes a perforation line forming unit 34.

[0023] Each widthwise sealing unit 31 extends slightly outward from the ends in the widthwise direction of the packing sheet P folded in half, and is located along the widthwise direction thereof. The widthwise sealing units 31 form a widthwise seal S1 extending in the widthwise direction, in the packing sheet P. Moreover, the length of each lengthwise sealing unit 32 is set to be slightly larger than a packably set length corresponding to one packet of the packets H formed in the packing sheet P. Then, each lengthwise sealing unit 32 is located along the open end Pa of the packing sheet P. The lengthwise sealing units 32 form a lengthwise seal S2 extending in the lengthwise direction, in the packing sheet P. The widthwise sealing units 31 are respectively provided to the upstream end portions of the lengthwise sealing units 32 in the feeding direction X. At least one of the pair of sealing units 30 includes a heater. The sealing unit 30 including the heater, of the pair of sealing units 30, is heated by the heater while the pair of sealing units 30 nips the packing sheet P folded in half, whereby the packing sheet P can be heat-sealed.

[0024] The perforation line forming unit 34 forms a perforation line M (see FIG. 3) in the widthwise direction of the packing sheet P. As illustrated in FIG. 2, the perforation line forming unit 34 includes: a blade 341 provided on an inner surface of the widthwise sealing unit 31 of one of the pair of sealing units 30; and a blade receiver 342 provided on an inner surface of the widthwise sealing unit 31 of the other of the pair of sealing units 30. While not illustrated here, the blade 341 is fixed to a base of the widthwise sealing unit 31. Meanwhile, the widthwise sealing unit 31 is fixed to the base by means of a spring. With this configuration, when the pair of sealing units 30 nips the packing sheet P, the widthwise sealing unit 31 moves toward the base, whereby the blade 341 fixed to the base protrudes from the inner surface of the widthwise sealing unit 31. Accordingly, when the pair of sealing units 30 nips the packing sheet P, the perforation line M can be formed in the packing sheet P by pressure of each widthwise sealing unit 31. Note that the perforation line M formed by the perforation line forming unit 34 of the present embodiment is given as a mere example, and the present invention is not limited thereto. That is, it is

sufficient that a structure that can assist a user of the medicine dispensing and packing apparatus or a patient to cut the packing sheet P in the widthwise direction can be formed in the packing sheet P, and a structure other than the perforation line M may be adopted.

[0025] In the heat sealing apparatus 3, the pair of sealing units 30 are placed so as to be opposed to each other with the packing sheet P being interposed therebetween. Accordingly, upon reception of a command from the control unit CONT (see FIG. 2), the seal driving unit 33 causes the pair of sealing units 30 to nip the packing sheet P from both the sides in their opposing direction and heat-seal (pressure-bond by heating) the packing sheet P. In this way, the packing sheet P is divided pack by pack, and the plurality of individually divided packets H are continuously formed. Along with this operation, the perforation line forming unit 34 forms the perforation line M in each heat-sealed portion. Moreover, the sheet feeding apparatus 4 to be described later variably adjusts the interval in the lengthwise direction (the X direction in the drawings) between the widthwise seals S1 formed by the widthwise sealing units 31. In the present embodiment, 60, 70, 80, and 90 mm can be selected as the lengthwise interval.

[0026] As described above, the heat sealing apparatus 3 heat-seals the packing sheet P being fed, in the state where the medicine is put in the packing sheet P. As illustrated in FIG. 3, the heat sealing apparatus 3 forms a plurality of empty packets HE in which the medicine is not packed, of the packets H, upstream of a last packet HL of the continuous medicine-containing packets of the packets H in the feeding direction X. That is, the plurality of formed packets H include the plurality of medicine-containing packets and the plurality of empty packets HE in which the medicine is not packed. The heat sealing apparatus 3 of the present embodiment forms by heat-sealing at least one of the plurality of formed empty packets HE such that the lengthwise size thereof is smaller than that of the last packet HL (in the present embodiment, a lengthwise size of 60 mm). In the present embodiment, as illustrated in FIG. 3 and FIG. 4, at least one narrow empty packet HEa (in the present embodiment, 20 mm) that is the empty packet having the smaller lengthwise size is formed adjacently to and immediately after the last packet HL (upstream of the last packet HL in the feeding direction X). The lengthwise size of the narrow empty packet HEa corresponds to a size for allowance when the packets H (packing sheet P) is cut off. Then, also with regard to a sealed portion of the narrow empty packet HEa, the perforation line forming unit 34 forms the perforation line M such that the perforation line M matches in position with the sealed portion.

[0027] The sheet feeding apparatus 4 feeds the packing sheet P in the lengthwise direction (the X direction in the drawings). The sheet feeding apparatus 4 includes a pair of feeding rollers 41 and a roller driving unit 43 (see FIG. 2) that is a driving unit that rotationally drives the pair of feeding rollers 41 and is connected to the control unit CONT. In the sheet feeding apparatus 4, upon reception of a command from the control unit CONT, the roller driving means 43 causes the pair of feeding rollers 41 to respectively rotate in directions indicated by arrows in FIG. 2. The packing sheet P can be fed by the rotations of the feeding rollers 41.

[0028] The medicine packing apparatus A further includes a dust collecting apparatus 5, a printing apparatus 6, and a cut-off blade unit 7. For example, as illustrated in FIG. 1, the dust collecting apparatus 5 includes: a shutter plate 51 including a dust collection port 51a that is partially cut out; and an air suctioning apparatus (not illustrated). If an operator gives a command to the dust collecting apparatus 5, the dust collecting apparatus 5 covers the medicine supply port 21b of the hopper 21 by means of the shutter plate 51 except the dust collection port 51a, and suctions air from the dust collection port 51a by means of the air suctioning apparatus. Consequently, air is suctioned from the medicine putting port 21a of the hopper 21, whereby residual medicine in the hopper 21 is cleaned. As a result, dust in the hopper 21 is collected.

[0029] As illustrated in FIG. 2, the printing apparatus 6 includes a print head 61 connected to the control unit CONT. In the printing apparatus 6, upon reception of a command from the control unit CONT, the print head 61 prints, prior to the medicine putting, information concerning medicine administration such as the date and time of administration and a patient name, at a position on the packing sheet P, the position corresponding to each packet H into which the medicine is to be put. The printing apparatus 6 is located upstream of the heat sealing apparatus 3 in the sheet feeding direction X. Note that the information concerning medicine administration such as the date and time of administration and a patient name is inputted by input means (not illustrated) provided to the medicine dispensing and packing apparatus, and is stored in storage means (not illustrated) similarly provided to the medicine dispensing and packing apparatus.

[0030] As illustrated in FIG. 2, the control unit CONT is connected to the seal driving unit 33, the roller driving unit 43, and the print head 61, can control the operation of the medicine packing apparatus A, and is connected to the storage means (not illustrated). The storage means is configured by a ROM and the like, and a control program is stored in the storage means. The control program is executed by the control unit CONT. The control program causes the control unit CONT to function as control means for a medicine packing operation and the like as described later.

[0031] As illustrated in FIG. 2, the cut-off blade unit 7 is located downstream of the heat sealing apparatus 3 in the feeding direction X, and is used by the user (such as an operator) to cut off the packing sheet P, more specifically, the plurality of individually divided packets H in a continuous state. In response to control of the control unit CONT, the sheet feeding apparatus 4 of the present embodiment feeds the packing sheet P such that the per-

foration line M stops so as to match in position with the cut-off blade unit 7.

[0032] The cut-off blade unit 7 includes a sawtooth blade. The cut-off blade unit 7 may have, for example, a blade including a curved portion 71 as illustrated in FIG. 5A, and may have, for example, a straight blade as illustrated in FIG. 5B. Moreover, the curved portion 71 may have a straight blade that obliquely extends as illustrated in FIG. 5A, and may have a curved blade.

[0033] In the case of the cut-off blade unit 7 including the curved portion 71 illustrated in FIG. 5A, a start point at which the user cuts off the packets H is located downstream of a portion other than the curved portion 71 of the cut-off blade unit 7 in the feeding direction X. Because of this positional relation, the user can start the cut-off of the packets H with almost no need to twist the packing sheet P as illustrated in FIG. 5A. In comparison with the straight blade, the user needs to considerably twist the packing sheet P as illustrated FIG. 5B, at the time of starting the cut-off. Accordingly, the usability of the medicine packing apparatus A can be improved.

[0034] Immediately after the heat sealing apparatus 3 forms the last packet HL located on the most upstream side in the feeding direction X, of the plurality of medicine-containing packets, the sheet feeding apparatus 4 of the present embodiment feeds the packing sheet P uniformly by 20 mm. The feeding by 20 mm is performed irrelevantly to the lengthwise size (in the present embodiment, a lengthwise size of 60 mm) of each medicine-containing packet. Once the feeding by 20 mm is performed, the heat sealing apparatus 3 forms the seals S1, S2 and the perforation line M in the packing sheet P. As a result, the narrow empty packet HEa is formed. Note that the feeding distance of 20 mm is given as a mere example, and can be set to a desired value.

[0035] After that, the sheet feeding apparatus 4 of the present embodiment feeds the packing sheet P by 60 mm twice in a row. Each time the feeding by 60 mm is performed, the heat sealing apparatus 3 forms the seals S1, S2 and the perforation line M in the packing sheet P. After the feeding is performed twice as described above, the perforation line M that is located upstream of the narrow empty packet HEa in the feeding direction X stops at the position of the cut-off blade unit 7. Consequently, the perforation line M matches in position with the cut-off blade unit 7, and hence the user can easily cut off the packets H. Accordingly, the packets H can be stably cut off. Moreover, the cut-off end of the packets H matches in position with the perforation line M, and thus can be straight and has a good appearance. Moreover, the ease of cut-off is less likely to fluctuate depending on the material of the packing sheet P.

[0036] The sheet feeding apparatus 4 of the present embodiment can shift the position at which the user cuts off the packets H, by 20 mm from the last packet HL to the upstream side in the feeding direction X. This can prevent the medicine from falling out due to an erroneous tear of the last packet HL at the time of cutting off the packets H.

[0037] Note that, in the present embodiment, because the packing sheet P is fed by 60 mm twice in a row as described above, the packing sheet P is fed by 120 mm as a result. The length of 120 mm matches with the distance from the formation position of the widthwise seal S1 in the heat sealing apparatus 3 to the cut-off blade unit 7, and is a size specific to the medicine packing apparatus A of the present embodiment. Two empty packets HE are formed such that the specific size (120 mm) is equally divided into two, that is, 60 mm. Note that the breakdown of the feeding by 120 mm is not limited. Instead of the feeding by 60 mm twice as in the present embodiment, for example, feeding by 40 mm and feeding by 80 mm may be combined, and the packing sheet P may be fed by 120 mm at once. Still alternatively, feeding by 140 mm obtained by totalizing the feeding by 20 mm and the feeding by 120 mm may be performed without forming the widthwise seal S1 on the way. Moreover, the equal division may be various equal divisions other than the equal division into two, as long as the packing sheet P is finally fed by 120 mm. In the present embodiment, after the formation of the last packet HL (60 mm), the packing sheet P is fed by 20 mm, 60 mm, and 60 mm in the stated order.

[0038] In the present embodiment, 140 mm obtained by adding 20 mm of the narrow empty packet HEa to 120 mm that is the size specific to the medicine packing apparatus A is a zone that does not contribute to medicine packing (a zone in which the medicine cannot be packed). As described above, 60, 70, 80, and 90 mm can be selected as the lengthwise interval between the widthwise seals S1 formed by the heat sealing apparatus 3. Here, it is assumed that empty packets each having a lengthwise size equal to that of the last packet HL are formed as in conventional cases. In the case of 60 mm, 60 x 3 - 140 = 40, so that the packing sheet P can be saved by 40 mm in the present embodiment. In the case of 80 mm, 80 x 2 - 140 = 20, so that the packing sheet P can be saved by 20 mm. In the case of 90 mm, 90 x 2 - 140 = 40, so that the packing sheet P can be saved by 40 mm. Meanwhile, only in the case of 70 mm, 70 x 2 - 140 = 0, so that the packing sheet P is not saved. However, according to evaluation based on the average value of the results for the respective selected values, the packing sheet P can be saved by 25 mm. That is, the medicine packing apparatus A of the present embodiment can reduce a waste of the packing sheet P compared with conventional medicine packing apparatuses.

[0039] Hereinabove, an embodiment of the present invention is described above, and the present invention is not limited to the embodiment, and can be variously changed within a range not departing from the gist of the present invention.

[0040] For example, instead of the packing sheet P folded in half, two elongated belt-shaped packing sheets opposed to each other can also be used. In this case, in order to prevent the medicine put by the medicine putting

unit 2 from coming out, the lengthwise lower end edges of the packing sheets need to be heat-sealed or pressed before the medicine putting.

[0041] Moreover, the heat sealing apparatus of the present embodiment includes the pair of substantially L-shaped sealing units 30. Not limited thereto, the sealing units may have various rod-like shapes, planar shapes, and frame-like shapes. Alternatively, the sealing units may have roller-like shapes.

[0042] Moreover, in the present embodiment, the heat sealing apparatus 3 that performs heat-sealing is described as the sealing apparatus. Alternatively, the sealing apparatus may perform sealing with an adhesive and the like instead of the heat-sealing.

[0043] Moreover, in the present embodiment, the perforation line forming unit 34 is provided to the heat sealing apparatus 3, and is controlled by the control unit CONT together with the pair of sealing units 30. Alternatively, the perforation line forming unit 34 may be provided separately from the heat sealing apparatus 3, and may be controlled by the control unit CONT separately from the pair of sealing units 30.

[0044] Moreover, in the present embodiment, the sheet feeding apparatus 4 feeds the packing sheet P such that the perforation line M stops so as to match in position with the cut-off blade unit 7. Not limited thereto, the sheet feeding apparatus 4 may feed the packing sheet P irrelevantly to the position of the cut-off blade unit 7.

[0045] Moreover, the sheet feeding apparatus 4 of the present embodiment feeds the packing sheet P such that the perforation line M that is located upstream of the narrow empty packet HEa in the feeding direction X stops at the position of the cut-off blade unit 7. Alternatively, the sheet feeding apparatus 4 may feed the packing sheet P such that the perforation line M that is located downstream of the narrow empty packet HEa in the feeding direction X stops at the position of the cut-off blade unit 7.

[0046] Moreover, in the present embodiment, the above-mentioned mechanism is applied to the medicine packing apparatus A, and this is given as a mere example. The above-mentioned mechanism can be widely applied to apparatuses for packing articles, in addition to the medicine packing apparatus A.

[0047] Lastly, configurations and operations of the present invention are summarized. The present invention provides the medicine dispensing and packing apparatus including: the sheet feeding apparatus 4 that feeds the elongated packing sheet P in the lengthwise direction thereof, the packing sheet P having the open end Pa formed in the lengthwise direction; the medicine putting unit 2 including the medicine putting port 21a that is located in the space in the packing sheet P through the open end Pa, the medicine putting unit 2 putting the medicine into the space in the packing sheet P from the medicine putting port 21a; the sealing apparatus (heat sealing apparatus) 3 that seals (heat-seals) the packing sheet P; and the control unit CONT that controls the sheet feeding apparatus 4 and the sealing apparatus 3 to form the plurality of individually divided packets H. The plurality of packets H include the plurality of medicine-containing packets and the plurality of empty packets HE in which the medicine is not packed. The control unit CONT controls the sheet feeding apparatus 4 and the sealing apparatus 3 to: seal the packing sheet P in which the medicine is put by the medicine putting unit 2; sequentially pack the medicine; and thereby form the plurality of medicine-containing packets. The control unit CONT further controls the sheet feeding apparatus 4 and the sealing apparatus 3 to: form the plurality of empty packets HE upstream of the plurality of medicine-containing packets in the packing sheet P in the feeding direction X of the packing sheet P; and form at least one empty packet (narrow empty packet) HEa of the plurality of empty packets HE such that the lengthwise size thereof is smaller than that of each medicine-containing packet.

[0048] According to the above-mentioned configuration, the lengthwise size of the at least one empty packet (narrow empty packet) HEa of the plurality of empty packets HE is smaller than that of each medicine-containing packet. Accordingly, the lengthwise size of the plurality of formed empty packets HE is a size obtained by adding the size for allowance when the user of the medicine dispensing and packing apparatus cuts off the packing sheet P, to the size of empty packets that are minimum required for the structure of the medicine dispensing and packing apparatus. As a result, the packing sheet P can be saved compared with the case where the plurality of empty packets HE each having a lengthwise size equal to that of each medicine-containing packet are formed.

[0049] Moreover, the control unit CONT may control the sheet feeding apparatus 4 and the sealing apparatus 3 to form the at least one empty packet (narrow empty packet) HEa adjacently to and further upstream of the medicine-containing packet (last packet) HL in the feeding direction X of the packing sheet P, the last packet HL being formed on the most upstream side in the feeding direction X of the packing sheet P, of the plurality of medicine-containing packets.

[0050] According to the above-mentioned configuration, the user of the medicine dispensing and packing apparatus can cut off the packing sheet P with the intermediation of the empty packet (narrow empty packet) HEa having the smaller lengthwise size, without directly cutting off a portion of the packing sheet P that is located upstream of the last packet HL in the feeding direction X. As a result, the user of the medicine dispensing and packing apparatus can cut off the packing sheet P without tearing the last packet HL, and can detach the plurality of medicine-containing packets from the medicine dispensing and packing apparatus.

[0051] Moreover, the medicine dispensing and packing apparatus may further include: the perforation line forming unit 34 that forms the perforation line M in the packing sheet P in the widthwise direction thereof; and

the cut-off blade unit 7 that is used by the user of the medicine dispensing and packing apparatus to cut off the plurality of medicine-containing packets downstream of the sealing apparatus 3 in the feeding direction X of the packing sheet P. The control unit CONT may control the perforation line forming unit 34 to form the perforation line M such that the perforation line M matches in position with the sealed portion S1 that extends in the widthwise direction on at least one of the upstream side and the downstream side of the at least one empty packet HEa in the feeding direction X of the packing sheet P. The control unit CONT may further control the sheet feeding apparatus 4 such that one of the formed perforation lines M stops so as to match in position with the cut-off blade unit 7.

[0052] According to the above-mentioned configuration, one of the perforation lines M can be adjusted to match in position with the cut-off blade unit 7. As a result, the user of the medicine dispensing and packing apparatus can easily cut off the packets H.

[0053] Moreover, the medicine dispensing and packing apparatus may further include: the perforation line forming unit 34 that forms the perforation line M in the packing sheet P in the widthwise direction thereof; and the cut-off blade unit 7 that is used by the user of the medicine dispensing and packing apparatus to cut off the plurality of medicine-containing packets downstream of the sealing apparatus 3 in the feeding direction X of the packing sheet P. The control unit CONT may control the sheet feeding apparatus 4 and the sealing apparatus 3 to variably adjust the seal interval in the lengthwise direction of the packing sheet P. The control unit CONT may further control the sheet feeding apparatus 4 and the perforation line forming unit 34 to form the perforation line M further upstream of the medicine-containing packet (last packet) HL in the feeding direction X of the packing sheet P, the last packet HL being formed on the most upstream side in the feeding direction X of the packing sheet P, of the plurality of medicine-containing packets. The control unit CONT may further control the sheet feeding apparatus 4 such that one of the formed perforation lines M stops so as to match in position with the cut-off blade unit 7, regardless of the lengthwise size of each medicine-containing packet.

[0054] According to the above-mentioned configuration, one of the formed perforation lines M can be adjusted to match in position with the cut-off blade unit 7, regardless of the lengthwise size of each medicine-containing packet. As a result, the user of the medicine dispensing and packing apparatus can easily cut off the packets H.

[0055] As described above, according to the present invention, the packing sheet P can be saved compared with the case where the plurality of empty packets HE each having a lengthwise size equal to that of each medicine-containing packet are formed. As a result, a waste of the packing sheet P can be suppressed.

REFERENCE SIGNS LIST

[0056]

1... Guide Unit
2... Medicine Putting Unit
21a... Medicine Putting Port
3... Sealing Apparatus, Heat Sealing Apparatus
34... Perforation Line Forming Unit
4... Sheet Feeding Apparatus
5... Dust Collecting Apparatus
6... Printing Apparatus
7... Cut-off Blade Unit
CONT... Control Unit
P... Packing Sheet
Pa... Open End
H... Packet
HL... Last Packet
HE... Empty Packet
HEa... Empty Packet Having Smaller Lengthwise Size, Narrow Empty Packet
S1... Sealed Portion, Widthwise Seal
M... Perforation Line
X... Feeding Direction, Lengthwise Direction

Claims

1. A medicine dispensing and packing apparatus comprising:

a sheet feeding apparatus that feeds an elongated packing sheet in a lengthwise direction thereof, the packing sheet having an open end formed in the lengthwise direction;
a medicine putting unit including a medicine putting port that is located in a space in the packing sheet through the open end, the medicine putting unit putting medicine into the space in the packing sheet from the medicine putting port;
a sealing apparatus that seals the packing sheet; and
a control unit that controls the sheet feeding apparatus and the sealing apparatus to form a plurality of individually divided packets, wherein
the plurality of packets include a plurality of medicine-containing packets and a plurality of empty packets in which the medicine is not packed,
the control unit controls the sheet feeding apparatus and the sealing apparatus to: sequentially pack the medicine by sealing the packing sheet in which the medicine is put by the medicine putting unit; and thereby form the plurality of medicine-containing packets, and
the control unit further controls the sheet feeding apparatus and the sealing apparatus to: form the plurality of empty packets upstream of the plurality of medicine-containing packets in the

packing sheet in a feeding direction of the packing sheet; and form at least one empty packet of the plurality of empty packets such that a lengthwise size thereof is smaller than that of each of the plurality of medicine-containing packets.

2. The medicine dispensing and packing apparatus according to claim 1, wherein the control unit controls the sheet feeding apparatus and the sealing apparatus to form the at least one empty packet adjacently to and further upstream of a medicine-containing packet in the feeding direction of the packing sheet, the medicine-containing packet being formed on the most upstream side in the feeding direction of the packing sheet, of the plurality of medicine-containing packets.

3. The medicine dispensing and packing apparatus according to claim 2, further comprising:

a perforation line forming unit that forms a perforation line in the packing sheet in a widthwise direction thereof; and
a cut-off blade unit that is used by a user of the medicine dispensing and packing apparatus to cut off the plurality of medicine-containing packets downstream of the sealing apparatus in the feeding direction of the packing sheet, wherein the control unit controls the perforation line forming unit to form the perforation line such that the perforation line matches in position with a sealed portion that extends in the widthwise direction on at least one of an upstream side and a downstream side of the at least one empty packet in the feeding direction of the packing sheet, and
the control unit further controls the sheet feeding apparatus such that one of the formed perforation lines stops so as to match in position with the cut-off blade unit.

4. The medicine dispensing and packing apparatus according to claim 1 or 2, further comprising:

a perforation line forming unit that forms a perforation line in the packing sheet in a widthwise direction thereof; and
a cut-off blade unit that is used by a user of the medicine dispensing and packing apparatus to cut off the plurality of medicine-containing packets downstream of the sealing apparatus in the feeding direction of the packing sheet, wherein the control unit controls the sheet feeding apparatus and the sealing apparatus to variably adjust a seal interval in the lengthwise direction of the packing sheet,
the control unit further controls the sheet feeding apparatus and the perforation line forming unit to form the perforation line further upstream of a medicine-containing packet in the feeding direction of the packing sheet, the medicine-containing packet being formed on the most upstream side in the feeding direction of the packing sheet, of the plurality of medicine-containing packets, and
the control unit further controls the sheet feeding apparatus such that one of the formed perforation lines stops so as to match in position with the cut-off blade unit, regardless of a lengthwise size of each of the plurality of medicine-containing packets.

FIG. 1

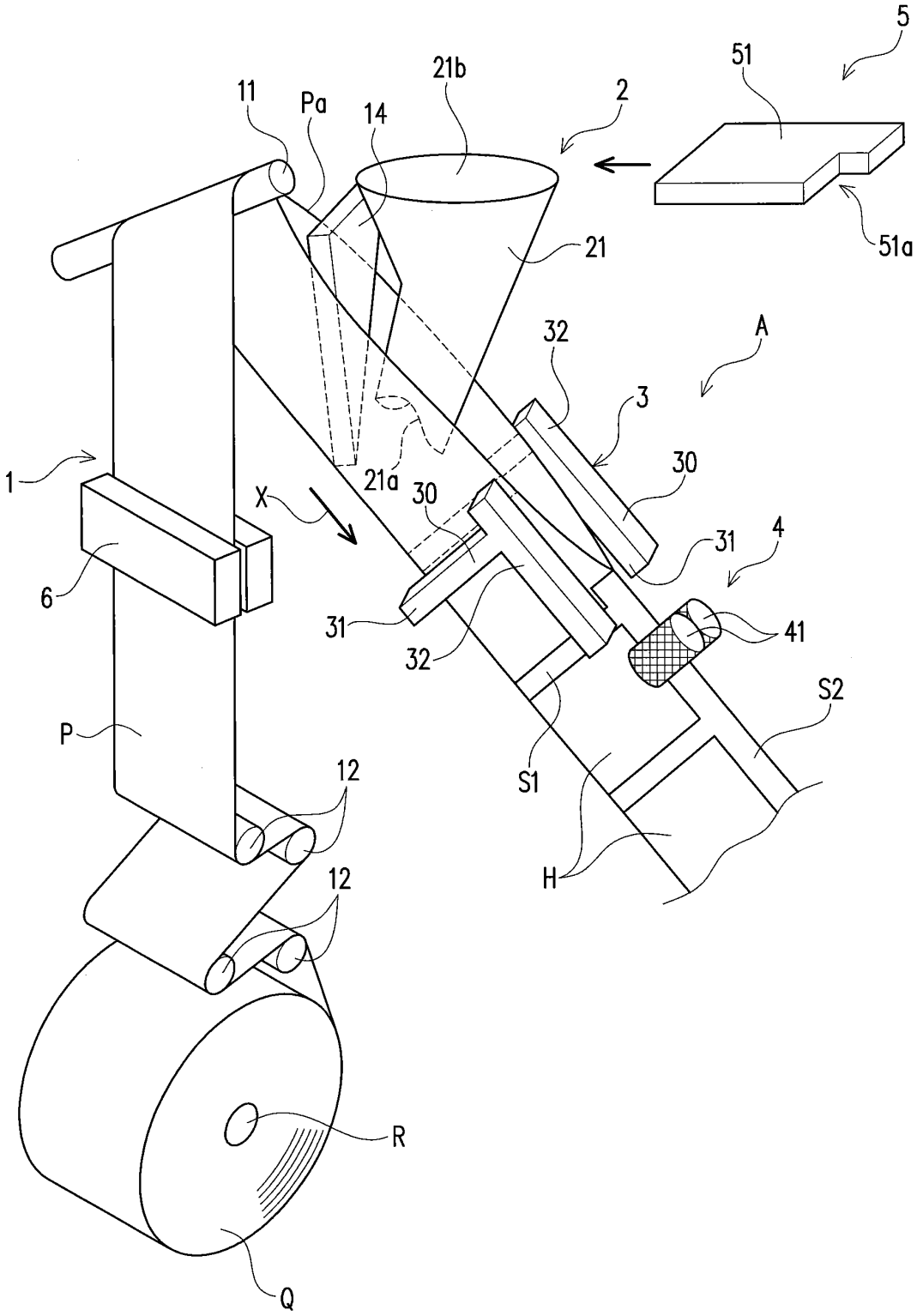
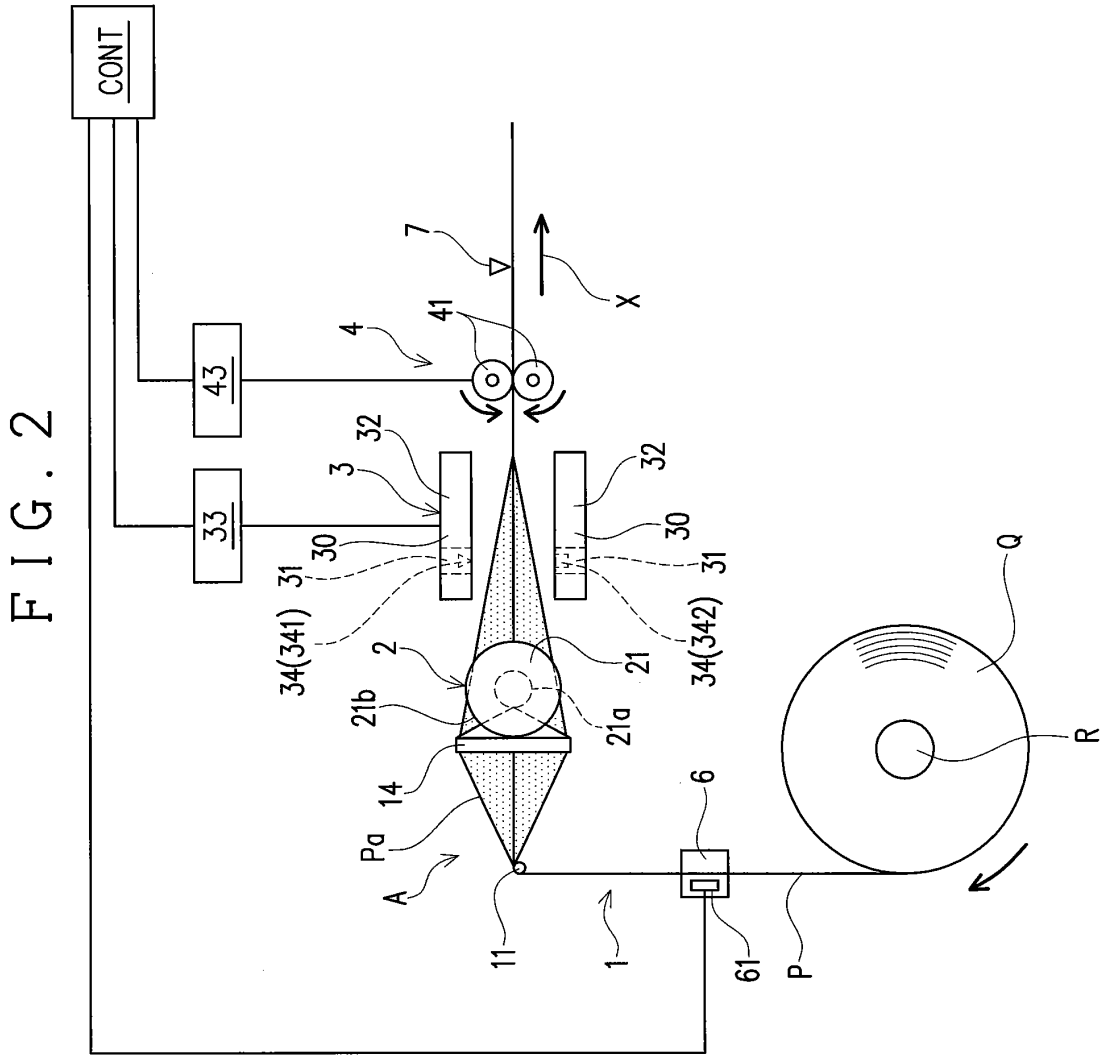

5
51
21b
11
Pa
14
2
51a
21
32
A
3
1
30
21a
30
X
31
4
6
31
41
32
S2
P
S1
12
H
12
R
Q

FIG. 2


CONT
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33
4
41
7
X
3
32
30
31
34(341)
2
21b
21a
21
34(342)
14
Pa
A
11
1
6
61
P
Q
R

FIG. 3

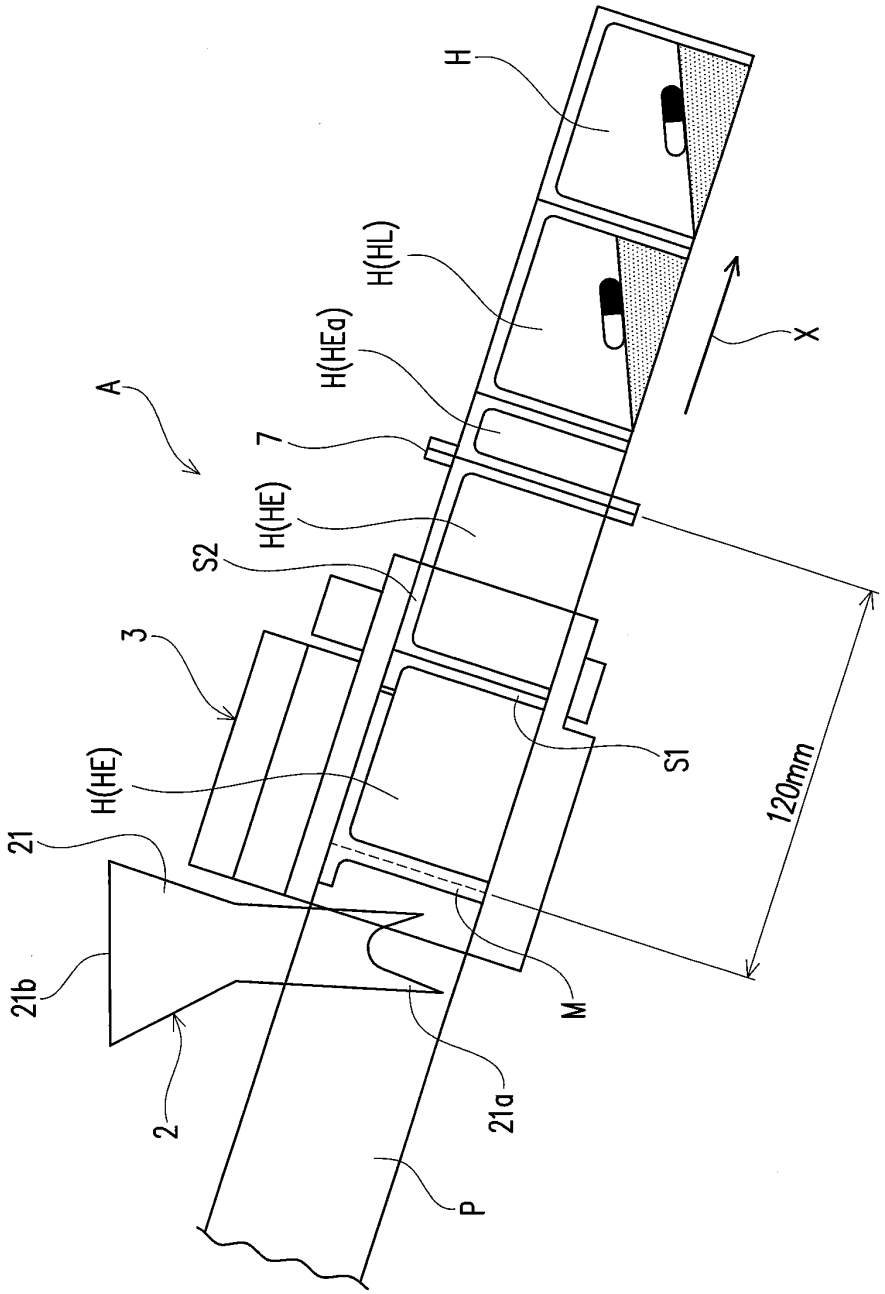


FIG. 4

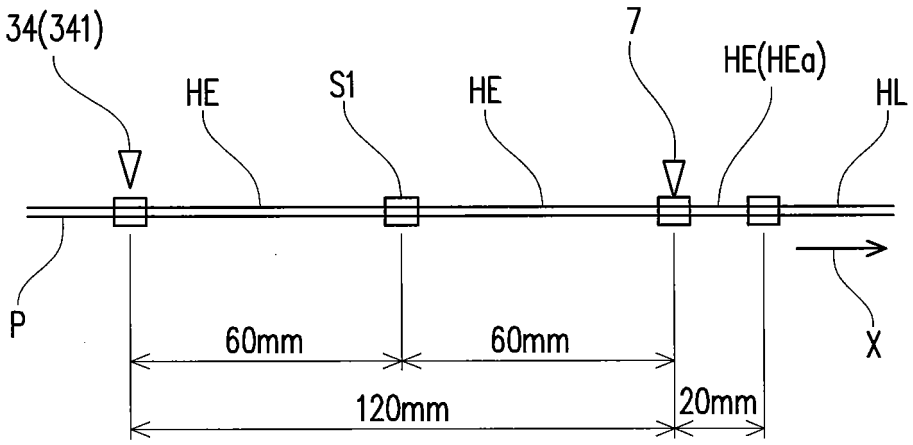


FIG. 5A

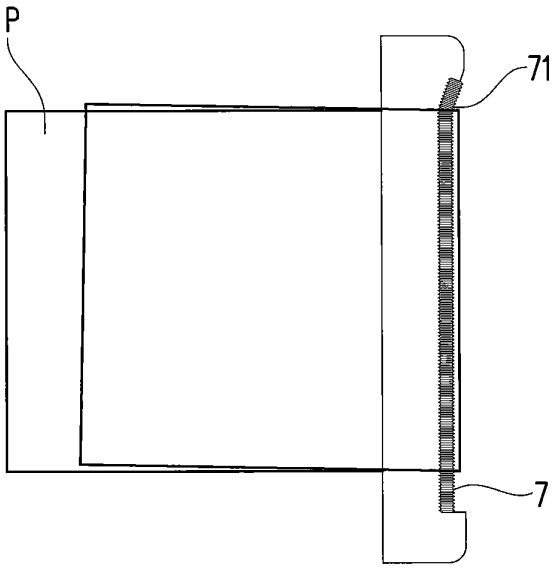


FIG. 5B

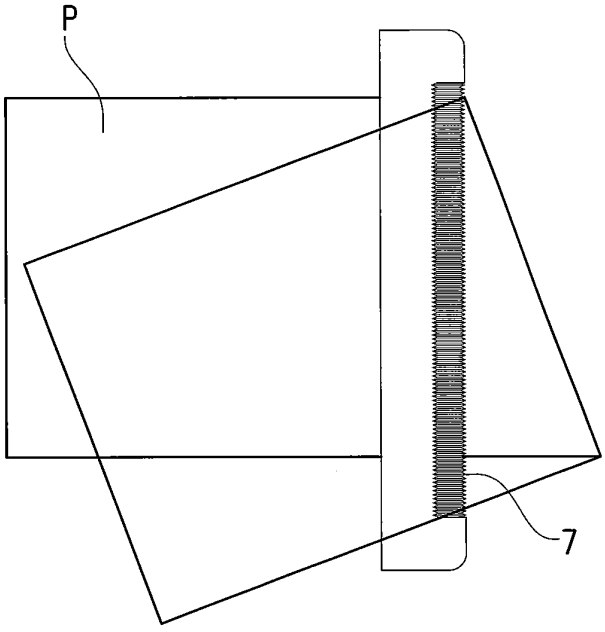


FIG. 6A

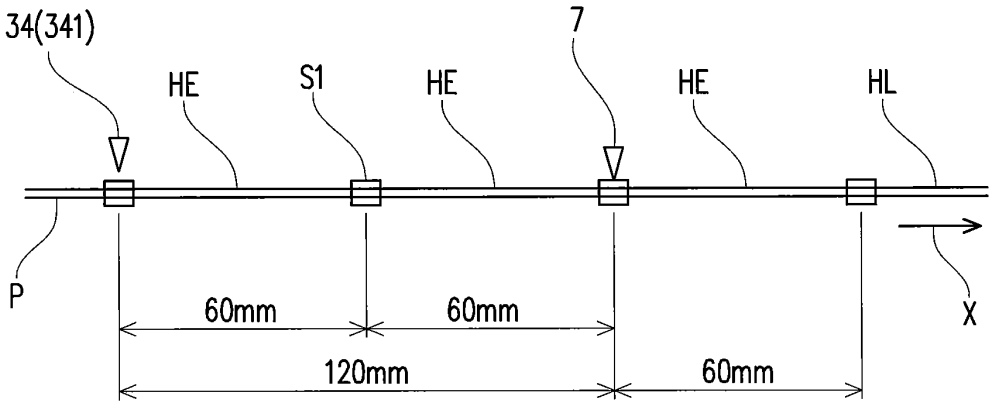


FIG. 6B

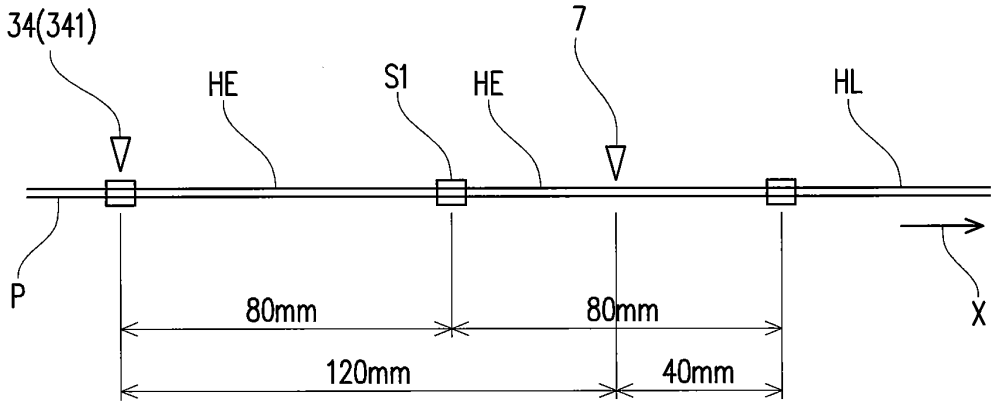
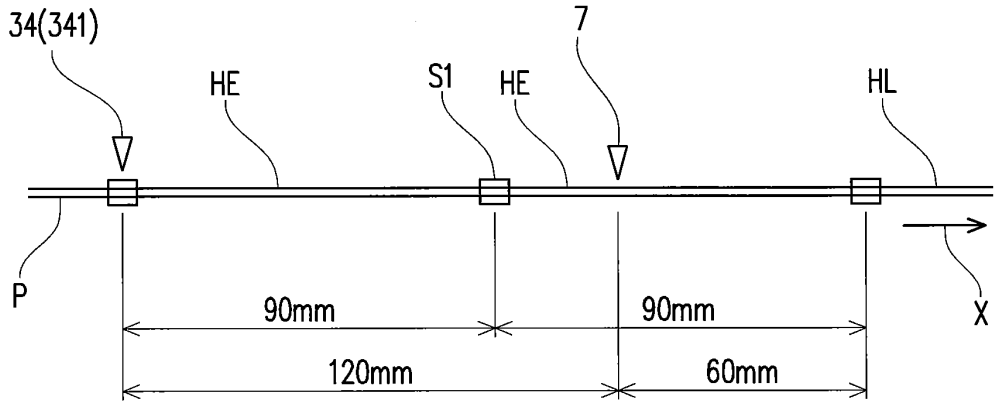


FIG. 6C



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/064190

A. CLASSIFICATION OF SUBJECT MATTER
B65B9/093(2012.01)i, *B65B57/00*(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)
B65B9/093, B65B57/00

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 1996-2013
Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2010/038377 A1 (Yuyama Mfg. Co., Ltd.), 08 April 2010 (08.04.2010), paragraph [0096]; fig. 37 to 38 & JP 2010-83573 A & US 2011/0197547 A1 & EP 2336032 A1 & CN 102143891 A & KR 10-2011-0053258 A & TW 201021786 A	1-4
Y	JP 09-202301 A (Yuyama Mfg. Co., Ltd.), 05 August 1997 (05.08.1997), paragraph [0063]; fig. 8 (Family: none)	1-4
Y	JP 11-104216 A (Ueda Avancer Corp.), 20 April 1999 (20.04.1999), paragraphs [0022], [0028] to [0029]; fig. 1 (Family: none)	3-4

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

* Special categories of cited documents:
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"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
24 June, 2013 (24.06.13)	02 July, 2013 (02.07.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/064190

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2005-212886 A (Takazono Corp.), 11 August 2005 (11.08.2005), fig. 9 (Family: none)	1-4
A	JP 2005-263318 A (JVM Co., Ltd.), 29 September 2005 (29.09.2005), paragraph [0009]; fig. 2 & KR 10-2005-0093523 A	1-4

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2012117385 A **[0001]**
- JP 2005212886 A **[0008]**