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(54) **AUTOMATIC MEDICINE PACKING MACHINE**

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(57) **ABSTRACT**

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An automatic medicine packing machine is provided. The automatic medicine packing machine includes a main body provided with a hopper installed at the lower portion thereof to allow medicines to be dropped thereinto and a plurality of cassette supports installed therein, cassettes, each cassette being installed on any one of the cassette supports and provided with a medicine storage space and a medicine discharge port formed therein, and a controller configured to sense points of time of discharge of medicines from the cassettes, to detect the positions of the cassettes accommodating the corresponding medicines if one or more medicine selection signals are transmitted to the controller, and to vary timings of discharge of the medicines through the medicine discharge ports of the detected cassettes so that points of time of dropping of the medicines into the hopper may coincide with each other.

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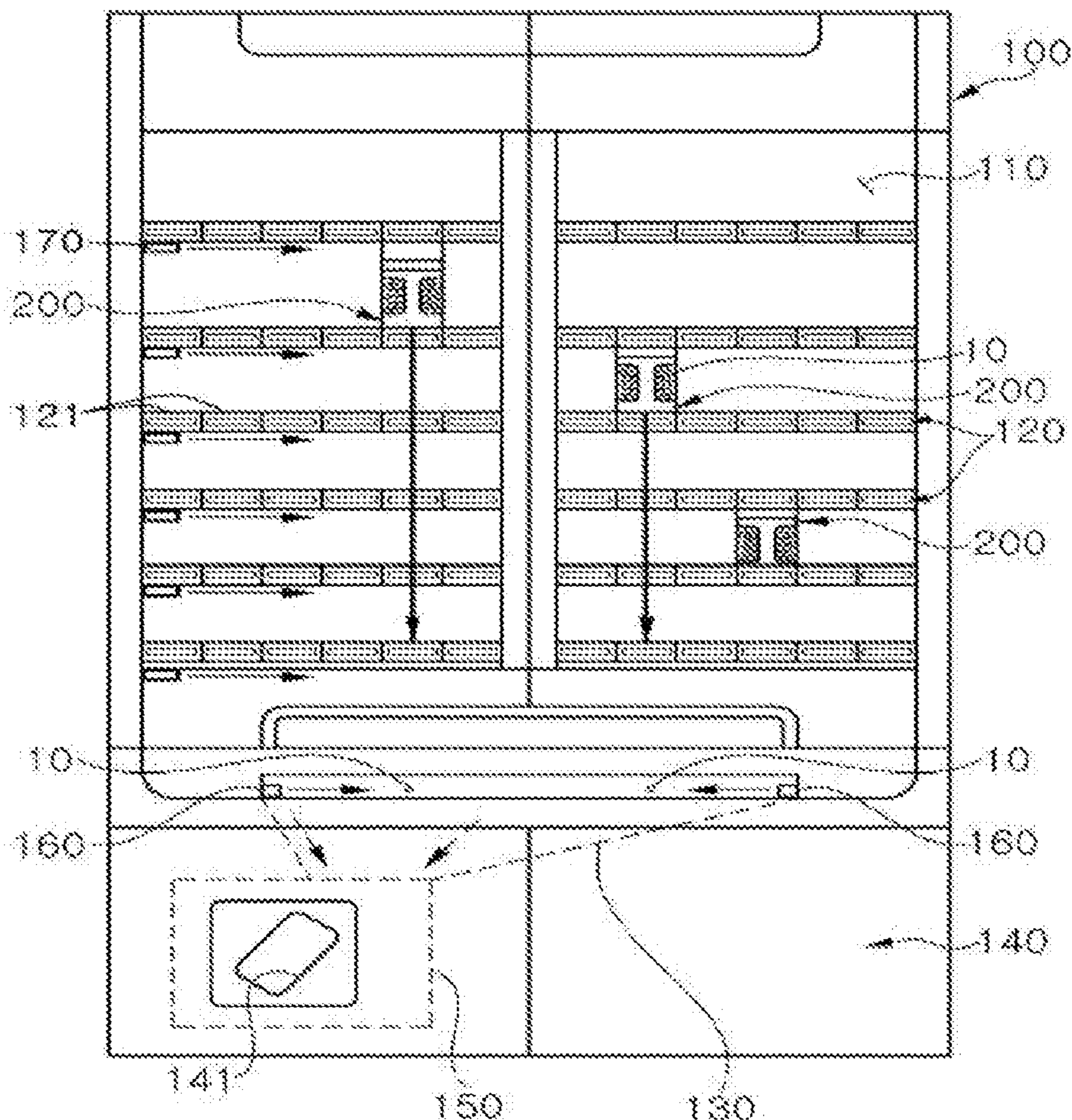
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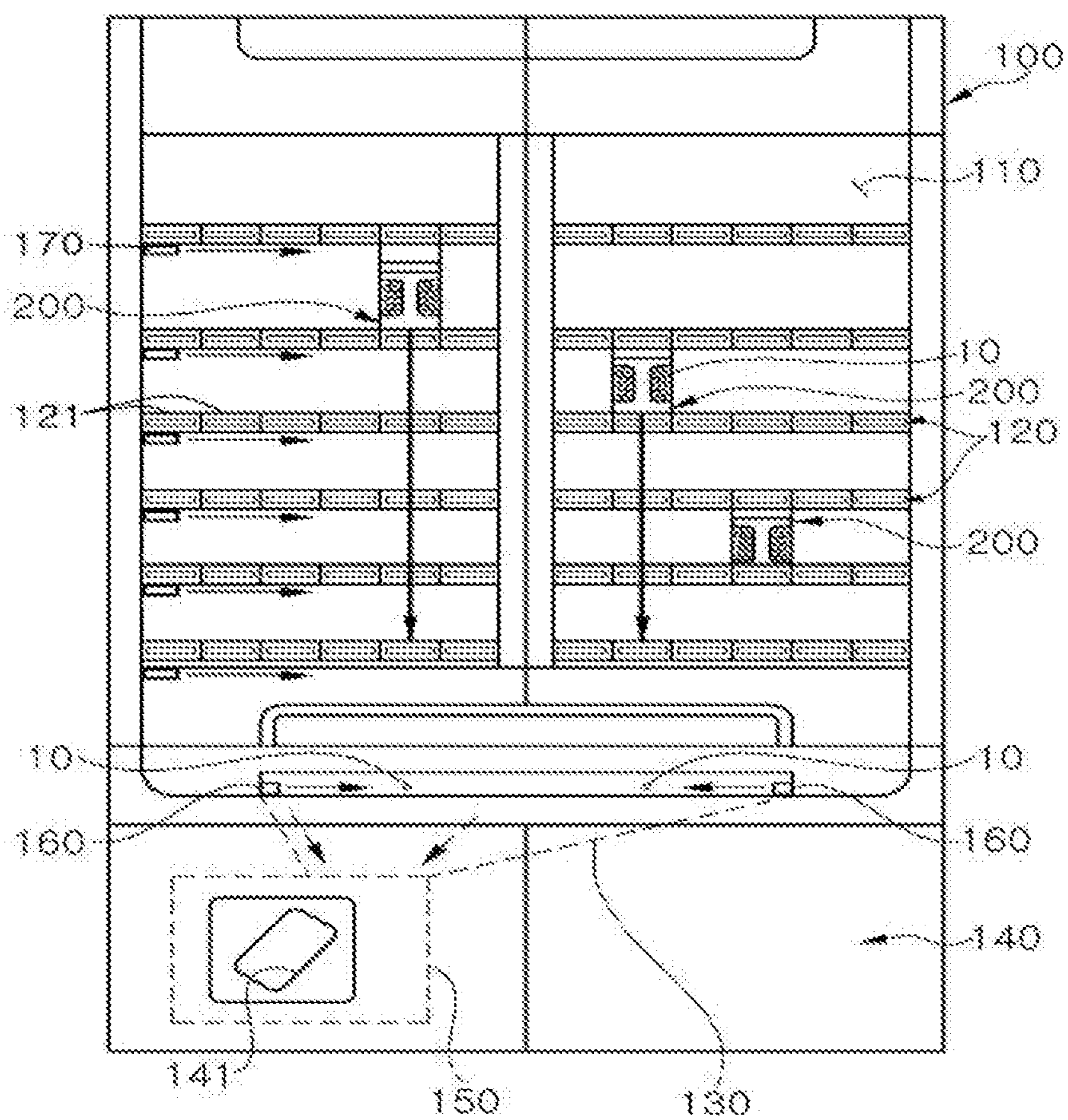


FIG. 1

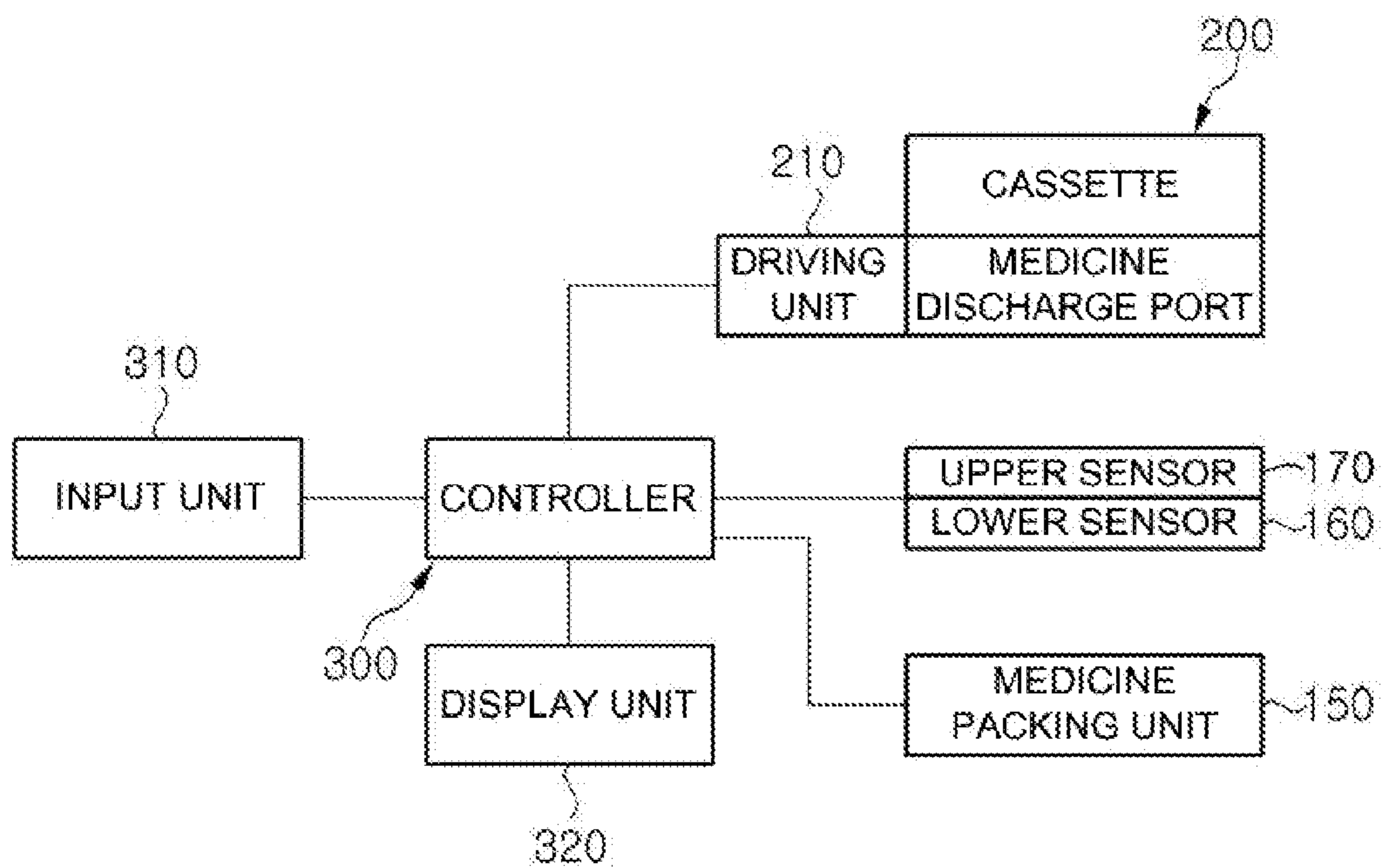


FIG. 2

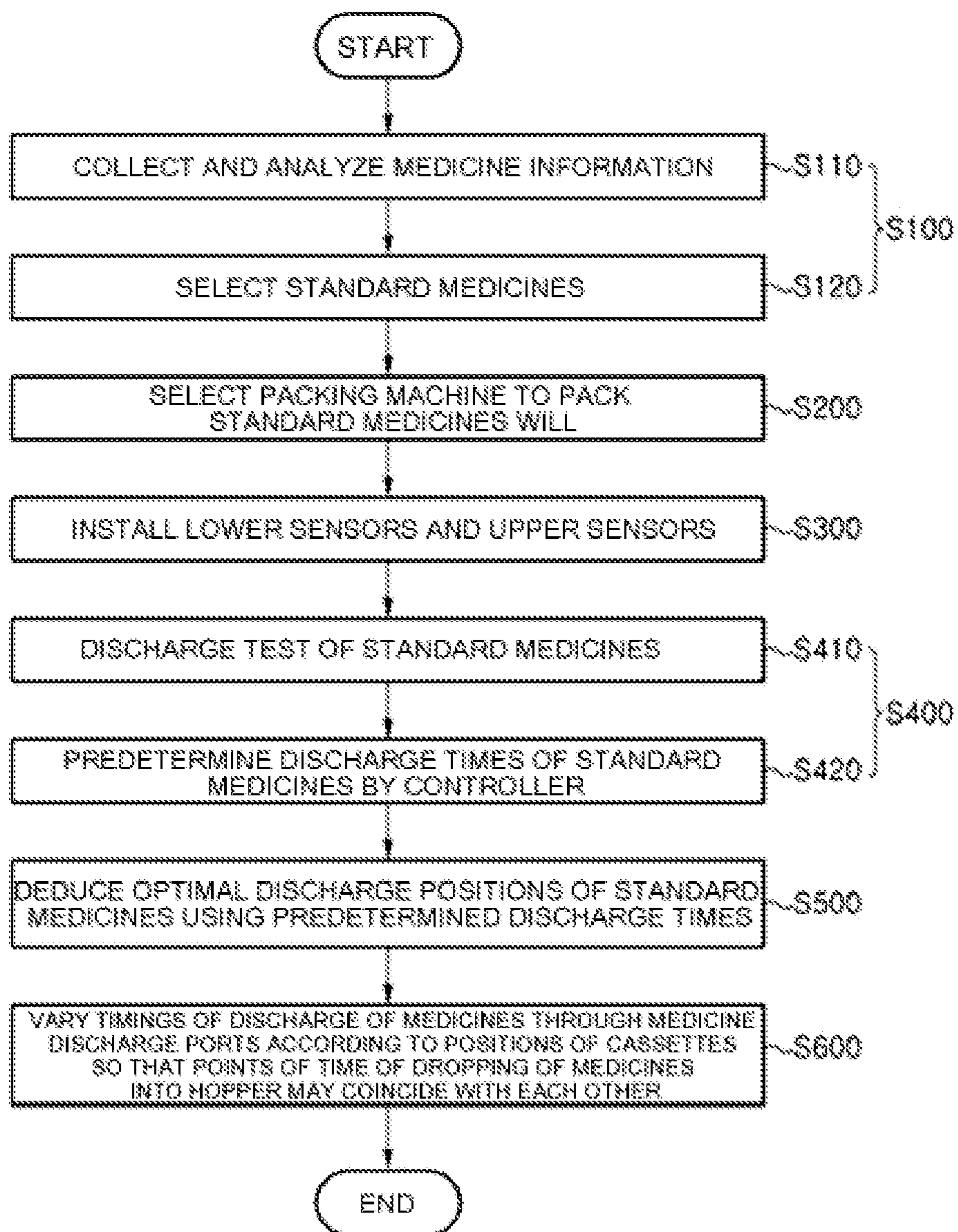


FIG. 3

AUTOMATIC MEDICINE PACKING MACHINE

BACKGROUND OF THE INVENTION

[0001] Field of the Invention

[0002] The present invention relates to an automatic medicine packing machine and, more particularly, to an automatic medicine packing machine which controls timings of discharge of medicines from cassettes so that respective points of time of dropping of the medicines discharged from the cassettes into a hopper coincide with each other and may thus increase a prescription filling speed and pack selected medicines without error so as to secure reliability.

[0003] Description of the Related Art

[0004] In general, an automatic medicine packing machine is used to automatically pack medicines prescribed by a doctor or a pharmacist based on a prescription.

[0005] A conventional automatic medicine packing machine includes a main body in which a plurality of cassette supports is installed, a hopper to gather medicines discharged from the main body, a packing unit to pack the medicines transmitted from the hopper and then to discharge the packed medicines to the outside, and cassettes installed on the cassette supports and accommodating medicines.

[0006] Further, the cassette includes a container provided with a medicine discharge port formed at the lower part thereof, and a driving unit installed on the body to discharge a dose of medicine through rotation of a rotary body.

[0007] However, in the conventional automatic medicine packing machine, the cassettes, which are installed at the same height, are located at different installation positions but have the same timing of discharge of medicines, thus, it takes a long time to pack the medicines.

[0008] As prior art documents related to the present invention, Korean Patent Laid-open Publication No. 10-1991-0004426 (Publication Date: Mar. 28, 1991) discloses a medicine packing machine.

SUMMARY OF THE INVENTION

[0009] Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide to an automatic medicine packing machine which controls timings of discharge of medicines from cassettes so that respective points of time of dropping of the medicines discharged from the cassettes into a hopper coincide with each other and may thus increase a prescription filling speed and pack selected medicines without error so as to secure reliability.

[0010] In accordance with the present invention, the above and other objects can be accomplished by the provision of an automatic medicine packing machine including a main body provided with a hopper installed at the lower portion thereof to allow medicines to be dropped therein and a plurality of cassette supports installed therein, cassettes, each cassette being installed on any one of the cassette supports and provided with a medicine storage space and a medicine discharge port formed therein, and a controller configured to sense points of time of discharge of medicines from the cassettes, to detect the positions of the cassettes accommodating the corresponding medicines if one or more medicine selection signals are transmitted to the controller, and to vary timings of discharge of the medicines through the medicine

discharge ports of the detected cassettes so that points of time of dropping of the medicines into the hopper may coincide with each other.

[0011] If the positions of selected cassettes are different, the controller may first discharge medicine from the cassette located at a relatively long distance from the hopper so that timing of collection of the medicine discharged from the cassette may coincide with timing of collection of medicine discharged from the cassette located at a relatively short distance from the hopper.

[0012] Lower sensors to sense the points of time of dropping of the medicines into the hopper so as to open the hopper may be installed in the hopper.

[0013] An upper sensor to sense a point of time of discharge of the medicine and then to transmit the sensed point of time to the controller may be installed on the cassette support or in the medicine discharge port of the cassette.

[0014] The controller may predetermine reference discharge times to discharge the medicines from the respective cassettes to the hopper according to the positions of the cassettes, and control the timings of discharge of the medicines through the medicine discharge ports based on the reference discharge times.

[0015] The reference discharge times may be predetermined by the controller via a discharge test process of the medicines.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0017] FIG. 1 is a front view illustrating an automatic medicine packing machine in accordance with the present invention;

[0018] FIG. 2 is a block diagram schematically illustrating the automatic medicine packing machine in accordance with the present invention; and

[0019] FIG. 3 is a flowchart exemplarily illustrating a method of mounting cassettes in the automatic medicine packing machine in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0021] Advantages and features of the present invention and a method of achieving the same will be more clearly understood from the following detailed embodiments taken in conjunction with the accompanying drawings.

[0022] However, the present invention is not limited by the embodiments which will be described hereinafter but may be variously modified. The embodiments are provided to those skilled in the art only to completely understand the scope and spirit of the present invention, and the present invention is defined only by the claims of the present invention.

[0023] In addition, in the following description of the present invention, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

[0024] FIG. 1 is a front view illustrating an automatic medicine packing machine in accordance with the present invention, FIG. 2 is a block diagram schematically illustrating the automatic medicine packing machine in accordance with the present invention, and FIG. 3 is a flowchart exemplarily illustrating a method of mounting cassettes in the automatic medicine packing machine in accordance with the present invention.

[0025] With reference to FIGS. 1 to 3, an automatic medicine packing machine in accordance with one embodiment of the present invention includes a main body 100, cassettes 200 and a controller 300.

[0026] First, an installation space 110 in which the cassettes 200 are installed is formed within the main body 100, and a hopper 130 into which medicines 10 are dropped is installed in the lower portion of the installation space 110.

[0027] Further, a lower case 140 provided with a packed medicine outlet 141 formed on the front surface thereof may be further installed under the main body 100, as exemplarily shown in FIG. 1.

[0028] A medicine packing unit 150 which packs the medicines 10 discharged from the hopper 130 within medicine packets and discharges the medicine packets to the outside through the packed medicine outlet 141 may be further installed in the lower case 140.

[0029] The medicine packing unit 150 may be installed under the hopper 130, as exemplarily shown in FIG. 1, continuously packs the medicines 10, discharged from the hopper 130, in the medicine packets and discharges the medicine packets to the outside through the packed medicine outlet 141.

[0030] For this purpose, a medicine packet supply unit (not shown) to supply medicine packets (not shown) may be installed in the lower case 140.

[0031] Further, a transparent window may be formed on the front surface of the main body 100 so that a worker may easily observe the installation space 110 from the outside.

[0032] In addition, lower sensors 160, which sense a point of time of discharge of the medicines 10 and transmit a signal to the controller 300, which will be described later, may be installed in the hopper 130 of the main body 100.

[0033] The lower sensors 160 sense a point of time of dropping of the medicines 10 into the hopper 130 so as to open the hopper 130. That is, the lower sensors 160 sense a point of time of dropping of the medicines 10 into the hopper 130, and then transmit the sensed point of time to the controller 300, which will be described later.

[0034] Although FIG. 1 illustrates the lower sensors 160 as being installed at the edge of the hopper 130, the installation position of the lower sensors 160 may be variously modified.

[0035] Further, an upper sensor 170, which senses a point of time of discharge of the medicine 10, may be installed at a medicine discharge port of the cassette 200.

[0036] The above-described lower sensors 160 and upper sensors 170 sense a point of time of dropping of the medicines 10 into the hopper 130 and points of time of discharge of the medicines 10 through the medicine discharge ports of the cassette 200 and then transmit drop sensing signals to the controller 300, which will be described later.

[0037] That is, the controller 300, which will be described later, may predetermine reference discharge times of selected medicines 10 using the lower sensors 160 and the upper sensors 170.

[0038] The cassettes 200 are installed at the cassette mounting positions 121 of cassette supports 120, and a medicine storage space is formed in the cassette 200.

[0039] Here, the medicine discharge port (not shown) to discharge the medicine 10 in the downward direction may be formed at the lower end of the cassette 20.

[0040] Further, a driving unit 210 to discharge the medicine 10 through the medicine discharge port may be installed in the cassette 20.

[0041] The driving unit 210 may include a motor (not shown) driven by power supplied from the outside and a rotary body (not shown) rotated by rotating force of the motor.

[0042] For example, as the rotary body is rotated by driving force of the motor, a dose of the medicine 10 may be discharged to the hopper 130 through the medicine discharge port.

[0043] Further, a communication module (not shown) may be further installed in the cassette 200, and the controller 300, which will be described later, may transmit an operating signal to the communication module of the cassette 200 and thus operate the driving unit 210 of the cassette 200.

[0044] The controller 300 controls the driving unit 210 of the cassette 200. Particularly, the controller 300 may sense a point of time of discharge of the medicine 10 from the cassette 200.

[0045] The controller 300, if a plurality of signals to select medicines 10 is transmitted to the controller 300 from a separate operating unit (not shown), detects the positions of the cassettes 200 accommodating the medicines 10.

[0046] Thereafter, the controller 300 drives the driving units 210 of the detected cassettes 200. Here, the controller 300 varies timings of discharge of the medicines 10 through medicine discharge ports of the detected cassettes 200 so that points of time of dropping of the discharged medicines 10 into the hopper 130 may coincide with each other.

[0047] Here, the controller 300 may predetermine reference discharge times of the medicines 10 via a test process using the upper sensors 170 and the lower sensors 160.

[0048] The reference discharge times are times at which the medicines 10 are discharged from the respective cassettes 200 to the hopper 130, and the controller 300 controls timings of discharge of the medicines 10 from the cassettes 200.

[0049] Further, an input unit 310 to select kinds of the medicines 10 may be electrically connected to the controller 300.

[0050] The input unit 310 may display a list of the medicines 10 predetermined by the controller 300 and include a selection switch to select the medicines 10 and a power control switch (not shown) to control power of the automatic medicine packing machine.

[0051] A separate display unit 320 to display various pieces of information regarding the medicines 10 to the outside may be installed in the input unit 310.

[0052] For example, if the positions of the selected cassettes 200 are different, the controller 300 may first discharge medicine 10 through the medicine discharge port of the cassette 200 located at a relatively long distance from the hopper 130 so that timing of collection of the medicine 10

discharged from such a cassette **200** coincides with timing of collection of medicine **10** discharged from the cassette **200** located at a relatively short distance from the hopper **130**.

[0053] Hereinafter, with reference to FIG. **3**, a method of mounting cassettes in the automatic medicine packing machine in accordance with the present invention will be exemplarily illustrated.

[0054] The method of mounting cassettes in the automatic medicine packing machine in accordance with the present invention may include selecting medicines (Operation **S100**), selecting an automatic medicine packing machine (Operation **S200**), installing sensors (Operation **S300**), setting discharge times (Operation **S400**), deducing positions (Operation **S500**), and discharging the medicines (Operation **S600**)

[0055] First, in Operation **S100**, information on medicines **10** is collected and analyzed and, thus, standard medicines **10** to be input to the automatic medicine packing machine are selected.

[0056] Further, in Operation **S100**, the medicines **10** may be classified according to information on the medicines **10**. That is, the medicines **10** may be classified according to various characteristics of the medicines **10** including types, such as tablets or capsules, sizes, whether or not coating is carried out, or images.

[0057] Moreover, in Operation **S100**, after selection of the standard medicines **10** based on information on the medicines **10**, designated quantities of the selected standard medicines **10** may be purchased.

[0058] Thereafter, in Operation **S200**, the automatic medicine packing machine to pack the standard medicines **10** selected in Operation **S100** is selected.

[0059] Thereafter, in Operation **S300**, the lower sensors **160** are installed in the hopper **130** and the upper sensors **170** are installed on the cassette supports **120** or the medicine discharge ports of the cassettes **200**.

[0060] Thereafter, in Operation **S400**, via a discharge test process of the standard medicines **10** (Operation **S410**), reference discharge times of the standard medicines **10** may be predetermined by the controller **300** (Operation **S420**).

[0061] Here, the method of mounting cassettes in the automatic medicine packing machine in accordance with the present invention may further include designing a database (DB) to store the reference discharge times of the medicines **10**, prior to Operation **S400**.

[0062] Further, in Operation **S400**, reference mounting positions of the standard medicines **10** are deduced using the predetermined reference discharge times

[0063] Thereafter, in Operation **S500**, optimal discharge positions of the standard medicines **10** are deduced using the reference discharge times predetermined in Operation **S400**.

[0064] Here, the optimal positions of the medicines **10** predetermined by the controller **300** may be the reference mounting positions, i.e., the cassette mounting positions **121** of the cassette supports **120** closest to the hopper **130**.

[0065] Finally, in Operation **S600**, the controller **300** controls operation of the cassettes **200** and, if one or more medicine selection signals are transmitted to the controller **300**, respectively selects the positions of the cassettes **200** accommodating the medicines **10**.

[0066] Thereafter, in Operation **S600**, timings of discharge of the medicines **10** through the medicine discharge ports vary according to the detected positions of the cassettes **200**

so that points of time of dropping of the discharged medicines **10** into the hopper **130** may coincide with each other.

[0067] Consequently, in the automatic medicine packing machine in accordance with the present invention, timings of discharge of medicines **10** from the cassettes **200** are controlled so that respective points of time of dropping of the medicines **10** discharged from the cassettes **200** into the hopper **130** coincide with each other and thus a prescription filling speed may be increased and selected medicines may be packed without error, thereby securing reliability.

[0068] Although the automatic medicine packing machine in accordance with the embodiment of the present invention has been described, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

[0069] As apparent from the above description, an automatic medicine packing machine in accordance with the present invention controls timings of discharge of medicines from cassettes so that respective points of time of dropping of the medicines discharged from the cassettes into the hopper coincide with each other and may thus increase a prescription filling speed and pack selected medicines without error so as to secure reliability.

[0070] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. An automatic medicine packing machine comprising:
 - a main body provided with a hopper installed at the lower portion thereof to allow medicines to be dropped therein and a plurality of cassette supports installed therein;
 - cassettes, each cassette being installed on any one of the cassette supports and provided with a medicine storage space and a medicine discharge port formed therein; and
 - a controller configured to sense points of time of discharge of medicines from the cassettes, to detect the positions of the cassettes accommodating the corresponding medicines if one or more medicine selection signals are transmitted to the controller, and to vary timings of discharge of the medicines through the medicine discharge ports of the detected cassettes so that points of time of dropping of the medicines into the hopper may coincide with each other.
2. The automatic medicine packing machine according to claim **1**, wherein, if the positions of selected cassettes are different, the controller first discharges medicine from the cassette located at a relatively long distance from the hopper so that timing of collection of the medicine discharged from the cassette may coincide with timing of collection of medicine discharged from the cassette located at a relatively short distance from the hopper.
3. The automatic medicine packing machine according to claim **1**, wherein:
 - lower sensors to sense the points of time of dropping of the medicines into the hopper so as to open the hopper are installed in the hopper.

4. The automatic medicine packing machine according to claim 1, wherein:

an upper sensor to sense a point of time of discharge of the medicine and then to transmit the sensed point of time to the controller is installed on the cassette support or in the medicine discharge port of the cassette.

5. The automatic medicine packing machine according to claim 1, wherein the controller predetermines reference discharge times to discharge the medicines from the respective cassettes to the hopper according to the positions of the cassettes, and controls the timings of discharge of the medicines through the medicine discharge ports based on the reference discharge times.

6. The automatic medicine packing machine according to claim 5, wherein the reference discharge times are predetermined by the controller via a discharge test process of the medicines.

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