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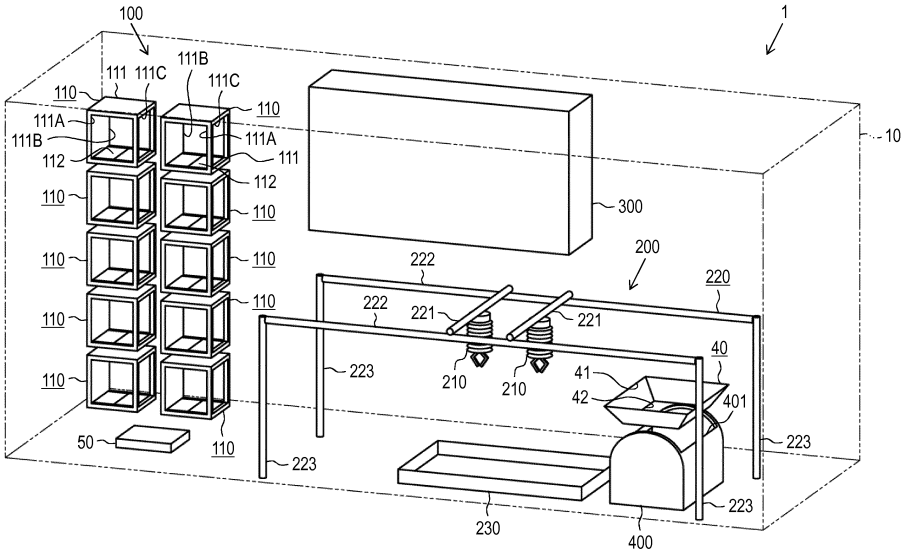
(54) CLOTHING PROCESSING DEVICE

(57) A clothing processing device according to this disclosure includes: a plurality of storing units capable of storing clothes; and a put-in unit capable of individually operating the plurality of storing units such that the clothes stored in the storing units are put in a washing machine. Accordingly, a user is not required to perform an operation of putting clothes sorted corresponding to the sorting condition in a washing machine each time washing of the clothes becomes necessary and hence, a burden imposed on the user is reduced. As a result, it is possible to provide a clothing processing device that can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

FIG. 2



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Description

TECHNICAL FIELD

[0001] This disclosure relates to a clothing processing device where clothes can be put in a washing machine.

BACKGROUND ART

[0002] A washing machine is used for washing clothes. PTL 1 discloses an example of a conventional washing machine.

[0003] As a method of washing clothes, there may be a case where clothes to be washed together are sorted corresponding to a sorting condition, and washing is performed individually with respect to the sorted clothes. The sorting condition is, for example, kinds of clothes or degrees of stain or dirt. According to such a washing method, a user is required to perform an operation of putting clothes sorted corresponding to the sorting condition in a washing machine each time washing of the clothes becomes necessary. Accordingly, a burden imposed on the user is large.

Citation List

Patent Literature

[0004] PTL 1: Unexamined Japanese Patent Publication No. 2006-255195

SUMMARY OF THE INVENTION

[0005] A clothing processing device according to this disclosure includes: a plurality of storing units capable of storing clothes; and a put-in unit capable of individually operating the plurality of storing units such that the clothes stored in the storing units are put in a washing machine.

[0006] The above-mentioned clothing processing device can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

BRIEF DESCRIPTION OF DRAWINGS

[0007]

FIG. 1 is a perspective view of a clothing processing device of an exemplary embodiment.

FIG. 2 is a perspective view showing an internal structure of the clothing processing device shown in FIG. 1.

FIG. 3 is a block diagram of the clothing processing device shown in FIG. 1.

FIG. 4 is a flowchart of a put-in control performed by the clothing processing device.

FIG. 5 is a flowchart of a take-out control performed by the clothing processing device.

FIG. 6 is a front view showing a state of the clothing processing device before the clothing processing device is operated.

FIG. 7 is an operational view showing a first operation of the clothing processing device.

FIG. 8 is an operational view showing a second operation of the clothing processing device.

FIG. 9 is an operational view showing a third operation of the clothing processing device.

FIG. 10 is an operational view showing a fourth operation of the clothing processing device.

DESCRIPTION OF EMBODIMENT

(One example of modes that clothing processing device can take)

[0008] According to one mode of a clothing processing device of this disclosure, the clothing processing device includes: a plurality of storing units capable of storing clothes respectively; and a put-in unit capable of individually operating the plurality of storing units such that the clothes stored in the storing units are put in a washing machine. According to the above-mentioned clothing processing device, the user can store clothes sorted corresponding to a sorting condition in the different storing units. The clothes stored in the storing units are put in the washing machine by the put-in units. Accordingly, a user is not required to perform an operation of putting clothes sorted corresponding to the sorting condition in the washing machine each time washing of the clothes becomes necessary and hence, a burden imposed on the user is reduced. In this manner, the above-mentioned clothing processing device can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

[0009] According to an example of the above-mentioned clothing processing device, the put-in unit includes a conveying unit for individually moving the plurality of storing units.

[0010] According to an example of the above-mentioned clothing processing device, the put-in unit includes a drive unit for operating the storing unit such that the clothes are put in the washing machine in a state where the storing unit is conveyed above the washing machine by the conveying unit.

[0011] According to an example of the above-mentioned clothing processing device, the drive unit opens a bottom of the storing unit for enabling putting of the clothes in the washing machine. According to the above-mentioned clothing processing device, the clothes are put in the washing machine by making the clothes fall from the bottom of the storing unit conveyed above the washing machine. In this manner, clothes can be put in the washing machine with the simple structure and hence, the structure of the clothing processing device can be simplified.

[0012] According to an example of the above-men-

tioned clothing processing device, the clothing processing device further includes: an operating unit capable of designating putting of the clothes stored in the storing unit in the washing machine among the clothes stored in the plurality of storing units; and a put-in controller for controlling put-in controllers in response to an operation of the operating unit. According to the above-mentioned clothing processing device, clothes to be put in the washing machine can be designated by operating the operating unit and hence, convenience of the clothing processing device can be enhanced compared to a case where the clothes to be put in the washing machine is determined without relying on a will of the user.

[0013] According to an example of the above-mentioned clothing processing device, the clothing processing device further includes: a gripping unit capable of gripping the clothes in the washing machine; and a take-out controller for controlling the gripping unit such that the clothes gripped by the gripping unit are taken out to the outside of the washing machine. According to the above-mentioned clothing processing device, after washing by the washing machine is completed, the clothes are taken out from the washing machine by the gripping unit. Accordingly, the user is not required to perform an operation of taking out the clothes sorted corresponding to the sorting condition from the washing machine each time washing of the clothes is completed and hence, a burden imposed on the user can be reduced. Accordingly, the above-mentioned clothing processing device can further reduce a burden imposed on the user who performs an operation relating to washing.

[0014] According to an example of the above-mentioned clothing processing device, when the whole clothes in the washing machine are taken out by the gripping unit, the put-in unit operates the storing unit such that clothes scheduled to be put in the washing machine next is put in the washing machine. According to the above-mentioned clothing processing device, a step of putting clothes stored in the storing unit in the washing machine by the put-in unit, and a step of taking out the clothes from the washing machine by the gripping unit after washing of the clothes by the washing machine is completed are sequentially repeated. That is, after the whole clothes in the washing machine are taken out, clothes to be put in the washing machine next is readily put in the washing machine. Accordingly, a time necessary for an operation relating to washing can be shortened.

[0015] According to an example of the above-mentioned clothing processing device, the clothing processing device further includes a post processing device that performs post processing of clothes taken out from the washing machine by the gripping unit. According to the above-mentioned clothing processing device, the post processing is performed by the post processing device after the clothes in the washing machine is taken out. Accordingly, a user is not required to perform an operation of applying post processing to the clothes sorted corresponding to the sorting condition each time washing of the clothes is completed and hence, a burden imposed on the user can be further reduced. In this manner, the above-mentioned clothing processing device can further contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

[0016] According to an example of the above-mentioned clothing processing device, the clothing processing device further includes a temporarily placing unit for temporarily placing the clothes, and the gripping unit places the clothes in the washing machine in the temporarily placing unit before post processing of the clothes are performed by the post processing device. According to the above-mentioned clothing processing device, the whole clothes in the washing machine are taken out in the temporarily placing unit before post processing is applied to the clothes whose washing is completed. Accordingly, compared to a case where post processing is performed in the step of taking out the clothes in the washing machine, a time necessary for taking out the whole clothes in the washing machine can be shortened. That is, the time from the completion of washing by the washing machine to starting of next washing by the washing machine can be shortened. Accordingly, a time necessary for an operation relating to washing can be further shortened.

[0017] According to an example of the above-mentioned clothing processing device, the clothing processing device further includes an imaging device capable of imaging the clothes before post processing is performed by the post processing device or the clothes to which the post processing is applied by the post processing device. The post processing device determines kinds of the clothes based on image information acquired from the imaging device, and stores clothes in the plurality of storing units corresponding to the kinds based on a result of the determination. According to the above-mentioned clothing processing device, clothes taken out from the washing machine can be stored in the storing units corresponding to the kinds of the clothes. Accordingly, the user is not required to perform an operation of sorting the clothes corresponding to kinds of the clothes sorted corresponding to the sorting condition each time washing of the clothes is completed and hence, a burden imposed on the user can be further reduced. In this manner, the above-mentioned clothing processing device can further contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

[0018] According to an example of the above-mentioned clothing processing device, the clothing processing device further includes a washing machine.

[0019] According to the above-mentioned clothing processing device, it is possible to acquire advantageous effects substantially equal to the advantageous effects acquired by the above-mentioned clothing processing device.

(Exemplary embodiment)

[0020] Clothing processing device 1 shown in FIG. 1 is a device for mechanically performing an operation relating to washing. Clothing processing device 1 includes body case 10, clothes put-in and take-out parts 11, inspection port 12, operating unit 20, and control device 30 (see FIG. 3). Body case 10 has a function of accommodating a plurality of mechanical elements. Body case 10 is mounted on a mounting surface (not shown in the drawing) such as a floor, for example. Body case 10 has a rectangular parallelepiped shape where a longitudinal direction and a lateral direction of body case 10 can be defined, for example. Control device 30 has a function of controlling various kinds of elements that form clothing processing device 1.

[0021] Clothes put-in and take-out parts 11 are openings through which clothes can be put in body case 10 and clothes can be taken out from the inside of body case 10. The number of clothes put-in and take-out parts 11 is set to two as one example. Clothes put-in and take-out parts 11 is mounted on a front surface of body case 10 and is covered by a cover (not shown in the drawing) that is automatically or manually openable and closeable, for example.

[0022] Inspection port 12 is an opening for inspecting the inside of body case 10. Inspection port 12 is formed on a front surface of body case 10 and is covered by a cover (not shown in the drawing) that is automatically or manually openable and closeable, for example. As one example, inspection port 12 is an opening larger than clothes put-in and take-out part 11, and through inspection port 12, clothes, blanket, or the like can be put in the inside of body case 10. Specifically, inspection port 12 is an opening through which clothes, blanket, or the like is put in washing machine 400 (see FIG. 2) accommodated in the inside of body case 10, and is an opening through which inspection of washing machine 400 is performed.

[0023] Operating unit 20 has a function of inputting information relating to an operation of clothing processing device 1. As one example, operating unit 20 is a touch panel display. That is, operating unit 20 also has a function of an alarm part. Operating unit 20 includes first operating unit 21, second operating unit 22, and a power source switch (not shown in the drawing). First operating unit 21 is formed of two individually mounted operating units, for example. Two operating units that form first operating unit 21 are disposed above respective clothes put-in and take-out parts 11 disposed on body case 10, for example. Second operating unit 22 is disposed above inspection port 12 of body case 10, for example. The power source switch has a function of switching on and off a power source of clothing processing device 1. When the power source of clothing processing device 1 is turned on, operation by each of operating units 21, 22 becomes available.

[0024] FIG. 2 shows an internal structure of clothing processing device 1. Clothing processing device 1 further includes clothes put-in device 100, clothes take-out device 200, post processing device 300, and washing machine 400. Washing machine 400 has a function of washing and drying clothes or the like. Washing machine 400 includes opening 401 that opens upward. Opening 401 communicates with the inside of washing machine 400. For example, washing machine 400 is mounted on a bottom surface in the inside of body case 10. The specific configuration and the manner of operation of washing machine 400 are substantially equal to those of a washing machine disclosed in Unexamined Japanese Patent Publication No. 2006-255195, for example, and hence, the description of such specific configuration and the manner of operation of washing machine 400 are partially or wholly omitted.

[0025] Clothes put-in device 100 has a function of putting clothes put in the inside of body case 10 from clothes put-in and take-out part 11 (see FIG. 1) in washing machine 400. Clothes put-in device 100 is accommodated in body case 10. Clothes put-in device 100 includes a plurality of storing units 110 and put-in units 120 (see FIG. 3).

[0026] Storing unit 110 has a function of storing clothes that can be put in washing machine 400 and a function of storing clothes that are washed or the like by washing machine 400. Storing unit 110 is a box having a space in which a plurality of clothes is stored, for example. The number of storing unit 110 is set to ten as an example. These storing units 110 are disposed in two lines, such that five storing units 110 are disposed in each line, for example.

[0027] Storing unit 110 includes box body 111, first opening 111A, second opening 111B, third opening 111C, and a pair of lower lids 112. Box body 111 has an approximately rectangular parallelepiped shape. First opening 111A is mounted on a front surface of box body 111, for example. That is, first opening 111A faces the front surface of body case 10. Second opening 111B is formed on a back surface of box body 111, for example. Third opening 111C is formed on a surface of box body 111 that faces post processing device 300 out of side surfaces of box body 111, for example. Each of openings 111A to 111C has an approximately square shape, and has a size that allows putting and taking of the clothes in and from box body 111 through openings 111A to 111C, for example.

[0028] The pair of lower lids 112 forms a bottom of box body 111. Lower lids 112 have a function of opening or closing the bottom of box body 111. The pair of lower lids 112 has a hinged double-door structure. When the bottom of box body 111 is closed by lower lids 112, clothes in storing unit 110 are supported by lower lids 112. That is, clothes are stored in the inside of storing unit 110. On the other hand, when the bottom of box body 111 is opened by lower lids 112, lower lids 112 are opened outward so that clothes in the inside of storing unit 110 fall down.

[0029] Put-in unit 120 has a function of individually operating a plurality of storing units 110 such that clothes stored in storing units 110 are put in washing machine 400. Put-in unit 120 includes conveying unit 121 and opening and closing drive unit 124 (see FIG. 3 with respect to both units).

[0030] Conveying unit 121 has a function of moving the plurality of storing units 110. Conveying unit 121 is mounted in the inside of body case 10 such that, in the step of moving the plurality storing units 110, storing units 110 and other elements accommodated in the inside of body case 10 do not interfere with each other. Conveying unit 121 includes rotary device 122 and reciprocating device 123 (see FIG. 3 with respect to both devices).

[0031] Rotary device 122 has a function of integrally rotating the plurality of storing units 110 in a clockwise direction or in a counterclockwise direction so as to change the arrangement of respective storing units 110 with respect to body case 10. That is, rotary device 122 integrally moves the plurality of storing units 110. Rotary device 122 is formed by connecting twelve bar members (not shown in the drawing) with each other using hinges. Moving fulcrum 122A (see FIG. 3) is disposed on each bar member. Each moving fulcrum 122A supports an outer surface of a surface of storing unit 110 that faces third opening 111C, for example. Rotary device 122 includes a drive unit (not shown in the drawing) that rotates the whole bar member.

[0032] Reciprocating device 123 has a function of conveying storing unit 110 disposed at an uppermost stage position above washing machine 400 and returns storing unit 110 to an initial position in a reciprocating manner. That is, reciprocating device 123 moves the plurality of storing units 110 individually. Reciprocating device 123 is formed of a chuck (not shown in the drawing) that is supported in a suspended manner by a wire, for example. Accordingly, a portion (not shown in the drawing) that can be gripped by the chuck is formed on a ceiling surface of each storing unit 110. Reciprocating device 123 includes a drive unit for opening and closing the chuck and a drive unit for pushing and pulling the wire (both parts not shown in the drawing).

[0033] Storing unit 110 to be moved by reciprocating device 123 is designated by an operation of first operating unit 21 (see FIG. 1), for example. That is, first operating unit 21 can designate one of storing units 100 in which the clothes are to be put in the washing machine 400. Accordingly, storing unit 110 designated by first operating unit 21 moves to an uppermost stage along with driving of rotary device 122 and, thereafter, is conveyed to the position above washing machine 400 along with driving of reciprocating device 123.

[0034] Storing units 110 at the center of body case 10 in a height direction face respective clothes put-in and take-out parts 11. That is, first openings 111A of center storing units 110 communicate with clothes put-in and take-out parts 11 respectively. Accordingly, clothes put in storing unit 110 through clothes put-in and take-out part 11 is stored in center storing unit 110, and clothes stored in center storing unit 110 can be taken out through clothes put-in and take-out part 11. Center storing unit 110 can be changed by driving rotary device 122 due to an operation of first operating unit 21.

[0035] Opening and closing drive unit 124 has a function of operating storing unit 110 such that clothes are put in washing machine 400 in a state where storing unit 110 is conveyed to the position above washing machine 400 by conveying unit 121. Opening and closing drive unit 124 is mounted on each storing unit 110, for example. As one example, by opening the bottom of storing unit 110 by opening and closing drive unit 124, clothes can be put in washing machine. That is, by opening lower lids 112 of storing unit 110 by opening and closing drive unit 124, clothes in storing unit 110 fall and are put in washing machine 400.

[0036] Clothes take-out device 200 has a function of taking out clothes in the inside of washing machine 400 to the outside of washing machine 400. Clothes take-out device 200 is accommodated in the inside of body case 10. Clothes take-out device 200 includes a plurality of arms 210 that form gripping units, support pipe 220, and temporarily placing unit 230.

[0037] Arm 210 has a function of gripping clothes in the inside of washing machine 400 so as to take out the clothes to the outside of washing machine 400. The number of arm 210 is set to two, for example. Arm 210 is extensible and shrinkable in a height direction of body case 10, for example. Arm 210 can adjust the rotation thereof around an axis along an extending and shrinking direction of arm 210, a clothes gripping strength, an angle of a portion that is used for gripping clothes or the like.

[0038] Support pipe 220 includes a pair of first support pipes 221, a pair of second support pipes 222, and two sets of third support pipes 223. First support pipes 221 have a function of supporting arms 210 in a movable manner in a longitudinal direction of body case 10. Each first support pipe 221 extends in the longitudinal direction of body case 10, for example. One first support pipe 221 supports one arm 210. The other first support pipe 221 supports the other arm 210. Arms 210 move in the longitudinal direction of body case 10 along first support pipes 221.

[0039] Second support pipes 222 have a function of supporting first support pipes 221 such that arms 210 move in a lateral direction of body case 10. Second support pipes 222 are disposed at positions higher than washing machine 400 in the height direction of body case 10 such that arms 210 can move to the position above washing machine 400. Second support pipes 222 extend in the lateral direction of body case 10, for example. One second support pipe 222 supports one end portions of respective first support pipes 221. The other second support pipe 222 supports the other end portions of respective first support pipes 221. Since first support pipes 221 move along second support pipes 222, arms 210 can move in the lateral direction of body case 10.

[0040] Third support pipes 223 have a function of supporting second support pipes 222. Third support pipes 223 extend in the height direction of body case 10, for example. One set of third support pipes 223 supports both end portions of one second support pipe 222. The other set of third support pipes 223 supports both end portions of the other second support pipe 222. The sets of third support pipes 223 are mounted on the bottom surface in the inside of body case 10 such that washing machine 400 is disposed between one third support pipe 223 and the other third support pipe 223 in the lateral direction of body case 10 and washing machine 400 is disposed between one set of third support pipes 223 and the other set of third support pipes 223 in the longitudinal direction of body case 10, for example. That is, support pipe 220 is provided so as not to obstruct an operation applied to clothes put in washing machine 400.

[0041] Temporarily placing unit 230 has a function of temporarily storing clothes taken out from washing machine 400. Temporarily placing unit 230 is a box having a space in which clothes are stored, and having an upper surface thereof opened, for example. Temporarily placing unit 230 has a volume larger than a volume of washing machine 400, for example. Temporarily placing unit 230 is mounted on the bottom surface of body case 10 at a position where arm 210 can move above temporarily placing unit 230 and where temporarily placing unit 230 is disposed adjacently to washing machine 400, for example.

[0042] Post processing device 300 has a function of performing post processing of clothes taken out from washing machine 400. Post processing performed by post processing device 300 includes at least one of steps including a step of attaching a tag on clothes, a step of additionally drying clothes, and a step of folding clothes. Post processing device 300 is accommodated in the inside of body case 10. The configuration for folding clothes and the manner of operation of such a configuration are substantially equal to those described in Japanese patent No. 5299934 and hence, the description with respect to such a configuration and the manner of operation is omitted.

[0043] Clothing processing device 1 further includes a guide unit 40 and dehumidifying device 50. Guide unit 40 has a function of guiding clothes to washing machine 400. Guiding unit 40 is disposed above washing machine 400 and between one second support pipe 222 and the other second support pipe 222 above washing machine 400 in the longitudinal direction of body case 10, for example. Guide unit 40 is formed in a hollow prism shape, for example. In the height direction of body case 10, first opening 41 that is an upper opening of guide unit 40 is larger than second opening 42 that is a lower opening of guide unit 40 and opening 401 of washing machine 400, for example. Second opening 42 is smaller than opening 401 of washing machine 400, for example. As one example, when clothes fallen from storing unit 110 or clothes fallen from arm 210 are placed on guide unit 40, the clothes are guided to washing machine 400.

[0044] Dehumidifying device 50 has a function of dehumidifying the inside of body case 10. Dehumidifying device 50 is accommodated in the inside of body case 10, for example. As one example, dehumidifying device 50 is disposed below the plurality of storing units 110. Dehumidifying device 50 is, for example, formed of a pipe having a large number of plate-like fins, and has a shape that allows a refrigerant to pass through the inside of the pipe. Dehumidifying device 50 cools a surface thereof due to, for example, evaporation of a refrigerant, thus causing dew condensation of moisture existing in the inside of body case 10, for example. In this manner, the inside of body case 10 is dehumidified.

[0045] FIG. 3 shows a connection relationship between elements that form clothing processing device 1. Clothes put-in device 100 further includes put-in controller 130. Put-in controller 130 has a function of controlling put-in unit 120 in response to an operation of first operating unit 21. As one example, put-in controller 130 performs a put-in control in response to designation of clothes to be put in washing machine 400 by operating first operating unit 21 (see FIG. 4). Put-in controller 130 forms control device 30.

[0046] Clothes take-out device 200 further includes a pair of arm drive units 241, a pair of front and rear drive units 242, a pair of left and right drive units 243, first imaging device 250, and take-out controller 260. Arm drive units 241 have a function of operating arms 210. Arm drive units 241 are respectively mounted on arms 210, for example. As one example, each arm drive unit 241 operates arm 210 in an extensible and shrinkable manner.

[0047] Front and rear drive units 242 have a function of moving arms 210 along first support pipes 221. Each of front and rear drive units 242 includes a ball screw and a motor (both parts not shown in the drawings), for example. The ball screw includes a threaded shaft and a nut, and is provided for converting the rotary motion of an output shaft of the motor into the translational motion of body case 10 in the longitudinal direction. The threaded shaft is mounted on each first support pipe 221, for example, and the nut is mounted on a proximal portion of each arm 210, for example. When take-out controller 260 rotates the motors, arms 210 individually move along first support pipes 221.

[0048] Left and right drive units 243 have a function of moving arms 210 in the lateral direction of body case 10. Each of left and right drive units 243 includes a ball screw and a motor (both parts not shown in the drawings), for example. The ball screw includes a threaded shaft and two nuts, and is provided for converting the rotary motion of an output shaft of the motor into the translational motion in the lateral direction of body case 10. The threaded shaft is mounted on each second support pipe 222, for example, and the nuts are mounted on both end portions of each first support pipe 221, for example. Since take-out controller 260 rotates the motors synchronously,

each first support pipe 221 moves along second support pipe 222 so that each arm 210 moves in the lateral direction of body case 10.

[0049] First imaging device 250 has a function of imaging an inside of washing machine 400. First imaging device 250 is a CCD (Charge Coupled Device) camera, for example. First imaging device 250 is disposed in the vicinity of opening 401 of washing machine 400, for example. First imaging device 250 outputs information acquired by imaging to take-out controller 260 and put-in controller 130, for example.

[0050] Take-out controller 260 has a function of controlling arms 210 such that clothes gripped by each arm 210 can be taken out to the outside of washing machine 400. Specifically, since take-out controller 260 controls drive units 241 to 243, before post processing is performed by post processing device 300, clothes taken out from washing machine 400 are placed on temporarily placing unit 230 (see FIG. 2). As one example, take-out controller 260 performs a take-out control when washing by washing machine 400 is completed (see FIG. 5). Further, take-out controller 260 can determine whether or not clothes gripped by arm 210 are entangled with each other, whether or not clothes exist in the inside of washing machine 400 or the like, based on image information acquired from first imaging device 250, for example. Take-out controller 260 forms control device 30.

[0051] Post processing device 300 includes post processing machine 310, second imaging device 320, and post processing controller 330. Post processing machine 310 has a function of applying post processing to clothes taken out from washing machine 400. Post processing machine 310 includes at least an arm (not shown in the drawing).

[0052] Second imaging device 320 has a function of imaging clothes before post processing is applied to clothes using post processing machine 310. Second imaging device 320 is a CCD camera, for example. Second imaging device 320 is mounted on temporarily placing unit 230 so as to enable imaging of clothes placed on temporarily placing unit 230, for example. Second imaging device 320 outputs information acquired by imaging to post processing controller 330.

[0053] Post processing controller 330 has a function of controlling post processing machine 310 such that post processing is applied to clothes, and a function of storing clothes in the plurality of storing units 110 for kinds of clothes. As one example, post processing controller 330 controls post processing machine 310 based on image information acquired by second imaging device 320.

[0054] Specifically, post processing controller 330 determines whether or not post processing is necessary for clothes, based on image information acquired by second imaging device 320, and when post processing controller 330 determines that post processing is necessary, post processing controller 330 controls post processing machine 310 such that post processing is applied to the clothes. Then, post processing controller 330 determines kinds of clothes based on image information acquired by second imaging device 320, and controls post processing machine 310 such that clothes are stored in the plurality of storing units 110 for kinds of clothes based on the determination result. As one example, clothes are gripped by the arm of post processing machine 310, and the clothes are stored in storing unit 110 through third opening 111C of storing unit 110. Clothes stored in the plurality of storing units 110 include clothes to which post processing is applied, and clothes that are determined that it is unnecessary to apply post processing. Post processing controller 330 forms control device 30.

[0055] Washing machine 400 further includes detection part 410, washing machine controller 420, a drying machine (not shown in the drawing), and a lid (not shown in the drawing). The drying machine has a function of drying washed clothes. The lid has a function of opening and closing opening 401 of washing machine 400. The number of the lids is set to three, for example. Opening and closing of the lid are controlled by washing machine controller 420.

[0056] Detection part 410 has a function of detecting foreign substances in the inside of washing machine 400. One example of detection part 410 is a weight sensor. Detection part 410 outputs detected information to washing machine controller 420. Washing machine controller 420 has a function of controlling various kinds of mechanical elements that form washing machine 400. By controlling these elements, clothes in the inside of washing machine 400 are washed, dried, or the like. Further, when washing machine controller 420 determines that foreign substances exist in the inside of washing machine 400 based on information acquired by detection part 410, washing machine controller 420 stops various kinds of controls. Washing machine 400 can change a washing condition or the like for each kind of clothes stored in storing unit 110 in response to operations of operating units 21, 22. For example, the washing condition includes washing courses that are preset corresponding to kinds of clothes, the degrees of contamination of clothes or the like, and a kind of a detergent, a softening agent, a bleaching agent or the like stored in washing machine 400.

[0057] FIG. 4 is one example of a flowchart of a put-in control performed by put-in controller 130.

[0058] Put-in controller 130 performs a put-in control based on a condition that clothes are put in one or the plurality of storing units 110, and clothes to be put first in washing machine 400 are designated by an operation of first operating unit 21. Specifically, storing unit 110 that stores clothes to be put in washing machine 400 first is designated by the operation of first operating unit 21,.

[0059] In step S11, put-in controller 130 moves storing unit 110 that stores clothes designated by controlling rotary device 122 (hereinafter referred to as "designated storing unit D") to a first position. The first position is a position at an uppermost stage in a line on a washing machine 400 side, for example.

[0060] In step S12, put-in controller 130 moves designated storing unit D to a second position by controlling reciprocating device 123. The second position is a position above washing machine 400 and facing washing machine 400 with guide unit 40 sandwiched therebetween, for example. In step S13, washing machine controller 420 opens opening 401 of washing machine 400 by controlling the lid of washing machine 400.

[0061] In step S14, put-in controller 130 opens lower lids 112 of designated storing unit D by controlling opening and closing drive unit 124. That is, the bottom of designated storing unit D is opened. Accordingly, clothes in the inside of designated storing unit D fall down toward washing machine 400. The fallen clothes are put in washing machine 400 through openings 41, 42 of guide unit 40 and opening 401 of washing machine 400. In the step of putting the clothes fallen from designated storing unit D in washing machine 400, when the clothes are brought into contact with an inner surface of guide unit 40, the clothes are guided to washing machine 400 along the inner surface. In step S15, washing machine controller 420 closes opening 401 of washing machine 400 by controlling the lid of washing machine 400. Then, after completion of put-in control including processing in steps S11 to S15, put-in controller 130 closes lower lids 112 of designated storing unit D by controlling opening and closing drive unit 124 and controls reciprocating device 123 such that designated storing unit D returns to an initial position. Thereafter, washing, drying, and the like by washing machine 400 are started.

[0062] FIG. 5 is one example of a flowchart of a take-out control performed by take-out controller 260.

[0063] When washing, drying, and the like by washing machine 400 are completed and opening 401 of washing machine 400 is opened, take-out controller 260 performs a take-out control.

[0064] In step S21, take-out controller 260 determines whether or not clothes exist in the inside of washing machine 400, based on image information acquired by first imaging device 250. When it is determined that clothes do not exist in the inside of washing machine 400 in step S21, the take-out control is finished. On the other hand, when it is determined that clothes exist in the inside of washing machine 400 in step S21, processing in step S22 is performed.

[0065] In step S22, take-out controller 260 recognizes an arrangement of clothes in the inside of washing machine 400 based on image information acquired by first imaging device 250, and moves arms 210 to a take-out position by controlling front and rear drive units 242 and left and right drive units 243. The take-out position is a position above washing machine 400 and facing washing machine 400 with guide unit 40 sandwiched therebetween, and corresponds to a position directly above clothes to be gripped by corresponding arm 210.

[0066] In step S23, take-out controller 260 allows arm 210 to grip clothes by controlling arm drive unit 241, based on image information acquired by first imaging device 250. Specifically, take-out control unit 260 adjusts a position of arm 210 in the height direction of body case 10 by extending or shrinking arm 210 and, thereafter, allows arm 210 to grip clothes. Then, clothes in the inside of washing machine 400 are gripped by both or one of arms 210 corresponding to a size or the like of the clothes. Different kinds of clothes may be gripped by the corresponding arms 210.

[0067] In step S24, take-out controller 260 slightly lifts up clothes gripped by arm 210 (hereinafter referred to as "gripped clothes") by controlling arm drive unit 241 and, thereafter, determines whether or not the gripped clothes are entangled with different clothes, based on image information acquired by first imaging device 250. When it is determined that the gripped clothes are not entangled with different clothes in step S24, processing in step S26 is performed. On the other hand, when it is determined that the gripped clothes are entangled with different clothes in step S24, processing in step S25 is performed.

[0068] In step S25, take-out controller 260 vibrates arm 210 such that the gripped clothes and different clothes are separated from each other by controlling arm drive unit 241. Vibration of arm 210 is generated by repeating extending and shrinking of arm 210, for example. Thereafter, processing advances to processing in step S26. Processing may be returned to step S24 after processing in step S25 is finished.

[0069] In step S26, take-out controller 260 takes out the gripped clothes from washing machine 400 by controlling drive units 241 to 243, and arranges arm 210 above temporarily placing unit 230. Next, take-out controller 260 controls drive units 241 to 243 such that the gripped clothes are placed on temporarily placing unit 230. Then, take-out controller 260 repeats the take-out control including processing in steps S21 to S26 until it is determined that clothes do not exist in the inside of washing machine 400 in step S21.

[0070] Thereafter, when it is determined that whole clothes in the inside of washing machine 400 are taken out from washing machine 400 based on image information acquired by first imaging device 250, for example, put-in controller 130 operates storing unit 110 such that clothes to be put in washing machine 400 next are put in washing machine 400. That is, put-in controller 130 performs a put-in control again based on image information acquired by first imaging device 250.

[0071] One example of the manner of operation of clothing processing device 1 is described with reference to FIG. 6 to FIG. 10 and FIG. 1 to FIG. 3. FIG. 6 to FIG. 10 are front views of clothing processing device 1, and in these drawings, the description of some constitutional elements of clothing processing device 1 is omitted.

[0072] A user who uses clothing processing device 1 turns on a power source of clothing processing device 1 by operating a power source switch of operating unit 20. By turning on the power source of clothing processing device 1, control device 30 and washing machine controller 420 (hereinafter referred to as "various kinds of

control devices") perform an inspection control as follows, for example.

[0073] The various kinds of control devices firstly compare detection values detected by various kinds of sensors and the like mounted on clothing processing device 1 with reference values corresponding to these sensors or the like. The various kinds of sensors include at least a water metering sensor, a vibration sensor, and detection part 410 mounted on washing machine 400. The reference values are preliminarily stored in memories of various kinds of control devices, for example. When it is determined that the difference between a detection value detected by the sensor or the like and a reference value is large in the various kinds of control devices, information that informs a user of the occurrence of an abnormal state is outputted on a display of operating unit 20, for example. As one example, when foreign substances exist in the inside of washing machine 400, information that informs a user of the occurrence of an abnormal state is outputted. In the various kinds of control devices, the inspection control is stopped until such an abnormal state is eliminated. On the other hand, in the various kinds of control devices, when it is determined that the difference between a detection value of the sensor or the like and a reference value is small, processing advances to a next step.

[0074] Next, in the various kinds of control devices, the positions of conveying unit 121 and arms 210 are compared with a reference point. The reference point is a point such as washing machine 400 or the like fixed to body case 10, for example. Specifically, in the various kinds of control devices, image conveying unit 121, arms 210, and the reference point are imaged by an imaging device (not shown in the drawing) that can image the whole area in the inside of body case 10, and it is determined whether or not a distance between conveying unit 121 and the reference point based on coordinates and distances between respective arms 210 and the reference point based on coordinates fall within predetermined ranges.

[0075] When it is determined that the distance between conveying unit 121 and the reference point and the distances between respective arms 210 and the reference point do not fall within the predetermined ranges, the various kinds of control devices allow operating unit 20 to display information that informs a user of an abnormal state on the display. The various kinds of control devices stop the detection control until such an abnormal state is eliminated, and control conveying unit 121 and drive units 241 to 243 such that the distances between conveying unit 121 and the reference point and the distances between respective arms 210 and the reference point fall within the predetermined ranges. On the other hand, when it is determined that the distance between conveying unit 121 and the reference point and the distances between respective arms 210 and the reference point fall within the predetermined ranges, the various kinds of control devices stop the detection control.

[0076] As shown in FIG. 6, a user who uses clothing processing device 1 sorts clothes to be washed together corresponding to a sorting condition, and puts the sorted clothes in different storing units 110 from clothes put-in and take-out part 11. The sorting condition is, for example, kinds of clothes or degrees of stain or dirt. Then, a user designates clothes to be put in washing machine 400 first by operating first operating unit 21, for example. Specifically, storing unit 110 that stores clothes to be put in washing machine 400 first is designated by the operation of first operating unit 21,. By operating first operating unit 21, the order of clothes to be put in washing machine 400, washing conditions for such clothes and the like also can be set for respective storing units 110.

[0077] Next, put-in controller 130 performs a put-in control shown in FIG. 7 and FIG. 8.

[0078] As shown in FIG. 7, firstly, put-in controller 130 performs a first operation. That is, put-in controller 130 moves designated storing unit D to a first position by controlling rotary device 122.

[0079] As shown in FIG. 8, put-in controller 130 performs a second operation next.

That is, put-in controller 130 controls put-in unit 120 such that clothes in the inside of designated storing unit D are put in washing machine 400. Specifically, put-in controller 130 firstly moves designated storing unit D to a second position by controlling reciprocating device 123. Next, put-in controller 130 opens lower lids 112 of designated storing unit D by controlling opening and closing drive unit 124. Accordingly, clothes in the inside of designated storing unit D fall down toward washing machine 400, and the clothes are put in washing machine 400. Finally, put-in controller 130 closes lower lids 112 of designated storing unit D by controlling opening and closing drive unit 124, and controls reciprocating device 123 such that designated storing unit D returns to an initial position.

[0080] After the put-in control by put-in controller 130 is finished, washing machine controller 420 starts washing, drying, and the like using washing machine 400. As one example, clothes in the inside of washing machine 400 are firstly washed, are dehydrated next, and, thereafter, are dried. Washing machine controller 420 opens opening 401 of washing machine 400 after washing, drying, and the like using washing machine 400 are finished.

[0081] Next, take-out controller 260 performs a take-out control shown in FIG. 9 and FIG. 10.

[0082] As shown in FIG. 9, take-out controller 260 firstly performs a third operation. That is, take-out controller 260 allows arms 210 to grip clothes in the inside of washing machine 400 by controlling drive units 241 to 243. Specifically, take-out controller 260 firstly recognizes the arrangement of clothes in the inside of washing machine 400, based on image information acquired by first imaging device 250, and moves arms 210 to take-out positions by controlling front and rear drive units 242 and left and right drive units 243. Next, take-out controller 260 allows arms 210 to grip clothes by controlling arm drive unit 241 based on image information acquired by first imaging de-

vice 250.

[0083] As shown in FIG. 10, take-out controller 260 performs a fourth operation next. That is, take-out controller 260 allows arms 210 to place gripped clothes on temporarily placing unit 230 by controlling drive units 241 to 243. Specifically, take-out controller 260 controls drive units 241 to 243 such that arms 210 take out the gripped clothes from washing machine 400, and arms 210 are arranged above temporarily placing unit 230. Next, take-out controller 260 controls arm drive unit 241 such that gripped clothes fall down from arms 210. Accordingly, clothes taken out from washing machine 400 are placed on temporarily placing unit 230.

[0084] Take-out controller 260 performs the take-out control shown in FIG. 9 and FIG. 10 in a repeated manner until it is determined that the whole clothes in the inside of washing machine 400 are taken out from washing machine 400 based on image information acquired by first imaging device 250. Then, when it is determined that whole clothes in the inside of washing machine 400 are taken out from washing machine 400 based on image information acquired by first imaging device 250, put-in controller 130 performs the put-in control shown in FIG. 7 and FIG. 8 again.

[0085] Finally, post processing controller 330 determines whether or not post processing is necessary for clothes placed on temporarily placing unit 230 based on image information acquired by second imaging device 320, and when it is determined that post processing is necessary, post processing controller 330 controls post processing machine 310 such that post processing is applied to the clothes. Post processing controller 330 also determines kinds of clothes based on image information acquired by second imaging device 320, and controls post processing machine 310 such that clothes are stored in the plurality of storing units 110 for kinds of clothes based on the result of the determination. Then, clothes stored in storing unit 110 are taken out from clothes put-in and take-out part 11.

[0086] As described above, according to clothing processing device 1, clothes put in storing unit 110 are put in washing machine 400, clothes whose washing is completed by washing machine 400 are taken out from washing machine 400, post processing is applied to clothes that require post processing and, thereafter, the clothes are stored in respective storing units 110 corresponding to kinds of clothes.

[0087] According to clothing processing device 1 of the exemplary embodiment, following advantageous effects can be acquired.

(1) According to clothing processing device 1, a user can store clothes sorted corresponding to a sorting condition in different storing units 110. The clothes stored in storing units 110 are put in washing machine 400 by put-in units 120. Accordingly, a user is not required to perform an operation of putting clothes sorted corresponding to the sorting condition in washing machine 400 each time washing of the clothes becomes necessary and hence, a burden imposed on the user is reduced. In this manner, clothing processing device 1 can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

(2) According to clothing processing device 1, clothes are put in washing machine 400 by making the clothes fall from the bottom of storing unit 110 conveyed above washing machine 400. In this manner, clothes can be put in washing machine 400 with the simple structure and hence, the structure of clothing processing device 1 can be simplified.

(3) According to clothing processing device 1, clothes to be put in washing machine 400 can be designated by operating first operating unit 21 and hence, convenience of clothing processing device 1 can be enhanced compared to a case where clothes to be put in washing machine 400 are determined without relying on an intention will of a user.

(4) According to clothing processing device 1, after washing by washing machine 400 is completed, clothes are taken out from washing machine 400 by arm 210. Accordingly, a user is not required to perform an operation of taking out clothes sorted corresponding to the sorting condition from washing machine 400 each time washing of the clothes is completed and hence, a burden imposed on the user can be reduced. Accordingly, clothing processing device 1 can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

(5) According to clothing processing device 1, a step of putting clothes stored in storing unit 110 in washing machine 400 by put-in unit 120, and a step of taking out clothes from washing machine 400 by arm 210 after washing of the clothes by washing machine 400 is completed are sequentially repeated. That is, after the whole clothes in washing machine 400 are taken out, clothes to be put in washing machine 400 next are readily put in washing machine 400. Accordingly, a time necessary for an operation relating to washing can be shortened.

(6) According to clothing processing device 1, post processing is performed by post processing device 300 after clothes in washing machine 400 are taken out. Accordingly, a user is not required to perform an operation of applying post processing to the clothes sorted corresponding to the sorting condition each time washing of the clothes is completed and hence, a burden imposed on the user can be further reduced. In this manner, clothing processing device 1 can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

(7) According to clothing processing device 1, the whole clothes in washing machine 400 are taken out in temporarily placing unit 230 before post process-

ing is applied to the clothes whose washing is completed. Accordingly, compared to a case where post processing is performed in the step of taking out the clothes in washing machine 400, a time necessary for taking out the whole clothes in washing machine 400 can be shortened. That is, the time from the completion of washing by washing machine 400 to starting of next washing by washing machine 400 can be shortened. Accordingly, a time necessary for an operation relating to washing can be further shortened.

(8) According to clothing processing device 1, clothes taken out from washing machine 400 are stored in storing units 110 corresponding to the kinds of the clothes. Accordingly, the user is not required to perform an operation of sorting the clothes corresponding to kinds of the clothes sorted corresponding to the sorting condition each time washing of the clothes is completed and hence, a burden imposed on the user can be further reduced. In this manner, clothing processing device 1 can contribute to the reduction of a burden imposed on a user who performs an operation relating to washing.

(9) According to clothing processing device 1, when clothes fallen from storing unit 110 are brought into contact with the inner surface of guide unit 40, the clothes are guided to washing machine 400 along the inner surface of guide unit 40. Accordingly, an accuracy that clothes fallen from storing unit 110 are put in washing machine 400 can be enhanced. Further, first opening 41 of guide unit 40 is larger than second opening 42 and hence, a portion that receives clothes fallen from storing unit 110 can be widened. Accordingly, an accuracy that clothes fallen from storing unit 110 are put in washing machine 400 can be further enhanced.

(10) According to clothing processing device 1, clothes put in storing unit 110 through clothes put-in and take-out part 11 are stored in storing unit 110, and clothes that are washed, dried, and the like are stored in storing unit 110. Accordingly, compared to a case where storing unit that stores clothes put in through clothes put-in and take-out part 11 and storing unit in which clothes whose washing, drying, and the like are finished are stored are different from each other, the structure of clothing processing device 1 can be simplified.

(Modification)

[0088] The description relating to the exemplary embodiment is merely an example that the clothing processing device of the present disclosure can take, and does not intend to limit the present invention to such an example. The clothing processing device according to the present disclosure can include, in addition to the exemplary embodiment, following modifications of the exemplary embodiment, and any configurations acquired by combining at least two modifications that do not contradict with each other, for example.

- A timing at which second imaging device 320 images clothes can be arbitrarily changed. In a first example, clothes to which post processing is applied by post processing machine 310 are imaged by second imaging device 320. In this case, post processing is applied to the whole clothes taken out from washing machine 400. In a second example, clothes to which post processing is not yet applied by post processing machine 310 and clothes to which post processing is applied by post processing machine 310 are imaged by second imaging device 320.
- Clothing processing device 1 according to a modification can take a mode where second imaging device 320 is omitted. In this modification, post processing is applied to the whole clothes taken out from washing machine 400.
- Clothing processing device 1 according to the modification further includes a plurality of other storing units in addition to the plurality of storing units 110. In this modification, clothes that can be put in washing machine 400 are stored in the plurality of storing units 110, and clothes that are washed or the like by washing machine 400 are stored in the plurality of another storing units.
- Clothing processing device 1 according to the modification can take a mode where temporarily placing unit 230 is omitted. In this modification, for example, post processing is applied to clothes immediately after being taken out from washing machine 400.
- The manner of operation of storing unit 110 by opening and closing drive unit 124 can be arbitrarily changed. In a first example, put-in controller 130 controls opening and closing drive unit 124 such that lower lids 112 are slid with respect to box body 111. Accordingly, the bottom of box body 111 is opened, and clothes in the inside of storing unit 110 fall down and are put in washing machine 400. In a second example, put-in controller 130 controls opening and closing drive unit 124 such that storing unit 110 is inclined with respect to washing machine 400. For example, when storing unit 110 is inclined such that third opening 111C of storing unit 110 faces downward, clothes in the inside of storing unit 110 fall through third opening 111C and are put in washing machine 400.
- The number of arm 210 can be arbitrarily changed. As one example, the number of arms 210 is one or three or more.
- Clothes take-out device 200 according to the modification includes another gripping unit having substantially the same function as arms 210 in place of arms 210.
- Conveying unit 121 according to the modification can take a mode where rotary device 122 is omitted. In this modification, for example, by making conveying unit 121 move a plurality of storing units 110 individ-

ually, storing unit 110 that stores clothes to be put in washing machine 400 is conveyed above washing machine 400.

- A mode of detection part 410 can be arbitrarily changed. In a first example, detection part 410 is an infrared sensor that can measure an amount of heat in the inside of washing machine 400. In a second example, detection part 410 is an ultrasonic sensor that can detect obstacles in the inside of washing machine 400.
- A relationship between first opening 41 and second opening 42 of guide unit 40 can be arbitrarily changed. In a first example, first opening 41 is smaller than second opening 42. In a second example, first opening 41 and second opening 42 have substantially the same size. Further, a relationship between second opening 42 and opening 401 of washing machine 400 also can be arbitrarily changed.
- Clothing processing device 1 according to the modification can take a mode where guide unit 40 is omitted.
- Clothing processing device 1 according to the modification can take a mode where dehumidifying device 50 is omitted.
- A mode of dehumidifying device 50 can be arbitrarily changed. As one example, dehumidifying device 50 is a drying material having high moisture adsorption property such as zeolite. Further, the arrangement of dehumidifying device 50 with respect to body case 10 also can be arbitrarily changed.
- Clothing processing device 1 according to the modification includes another clothes put-in and take-out part in place of or in addition to clothes put-in and take-out part 11. Another clothes put-in and take-out part is mounted on a back surface of body case 10, for example. Clothes that are put in through another clothes put-in and take-out part are put in storing unit 110 through third opening 111C.
- Storing unit 110 according to the modification can take a mode where third opening 111C is omitted.
- Operating unit 20 according to the modification can take a mode where second operating unit 22 is omitted.
- According to clothing processing device 1 of the modification, processing in step S24 and processing in step S25 are omitted from processing in the take-out control shown in FIG. 5.
- The number of storing unit 110 can be arbitrarily changed. As one example, the number of storing units is two or more and nine or less, or eleven or more.
- Clothing processing device 1 according to the modification can take a mode where elements that form at least one of clothes take-out device 200, post processing device 300, and washing machine 400 are partially or wholly omitted.

INDUSTRIAL APPLICABILITY

[0089] Clothing processing device according to this disclosure is applicable to various kinds of clothing processing devices including a business-use clothing processing device and a household clothing processing device.

REFERENCE MARKS IN THE DRAWINGS

[0090]

1: clothing processing device
20: operating unit
110: storing unit
120: put-in unit
121: conveying unit
124: opening and closing drive unit (drive unit)
130: put-in controller
210: arm (gripping unit)
230: temporarily placing unit
260: take-out controller
300: post processing device
320: second imaging device (imaging device)
400: washing machine

Claims

1. A clothing processing device comprising:

a plurality of storing units that store clothes; and a put-in unit capable of individually operating the plurality of storing units, to put the clothes stored in the storing units into a washing machine.

2. The clothing processing device according to claim 1, wherein the put-in unit includes a conveying unit that individually moves the plurality of storing units.

3. The clothing processing device according to claim 2, wherein the put-in unit includes a drive unit that operates each of the storing units being conveyed above the washing machine by the conveying unit, to put the clothes in the washing machine.

4. The clothing processing device according to claim 3, wherein the drive unit opens a bottom of each of the storing units to put the clothes in the washing machine.

5. The clothing processing device according to claim 1, wherein the clothing processing device further includes:

an operating unit capable of designating one of the storing units in which the clothes are to be put in the washing machine; and

a put-in controller that controls the put-in unit in response to an operation of the operating unit.

6. The clothing processing device according to claim 1, wherein the clothing processing device further includes
a gripping unit capable of gripping the clothes in the washing machine and
a take-out controller that causes the gripping unit to take out the clothes gripped by the gripping unit to an outside of the washing machine.

7. The clothing processing device according to claim 6, wherein when the clothes in the washing machine are entirely taken out by the gripping unit, the put-in unit operates the storing unit to put clothes to be put in the washing machine next in the washing machine.

8. The clothing processing device according to claim 6, wherein the clothing processing device further includes a post processing device that performs post processing of the clothes taken out from the washing machine by the gripping unit.

9. The clothing processing device according to claim 8, wherein
the clothing processing device further includes a temporarily placing unit that temporarily places the clothes, and
the gripping unit places the clothes taken out from the washing machine in the temporarily placing unit before post processing of the clothes are performed by the post processing device.

10. The clothing processing device according to claim 8, wherein
the clothing processing device further includes an imaging device capable of imaging the clothes before post processing is performed by the post processing device or the clothes on which the post processing is performed by the post processing device, and
the post processing device determines kinds of the clothes based on image information acquired from the imaging device, and stores the clothes in the plurality of storing units corresponding to the kinds based on a determination result.

11. The clothing processing device according to claim 1, wherein the clothing processing device further includes the washing machine.

FIG. 1

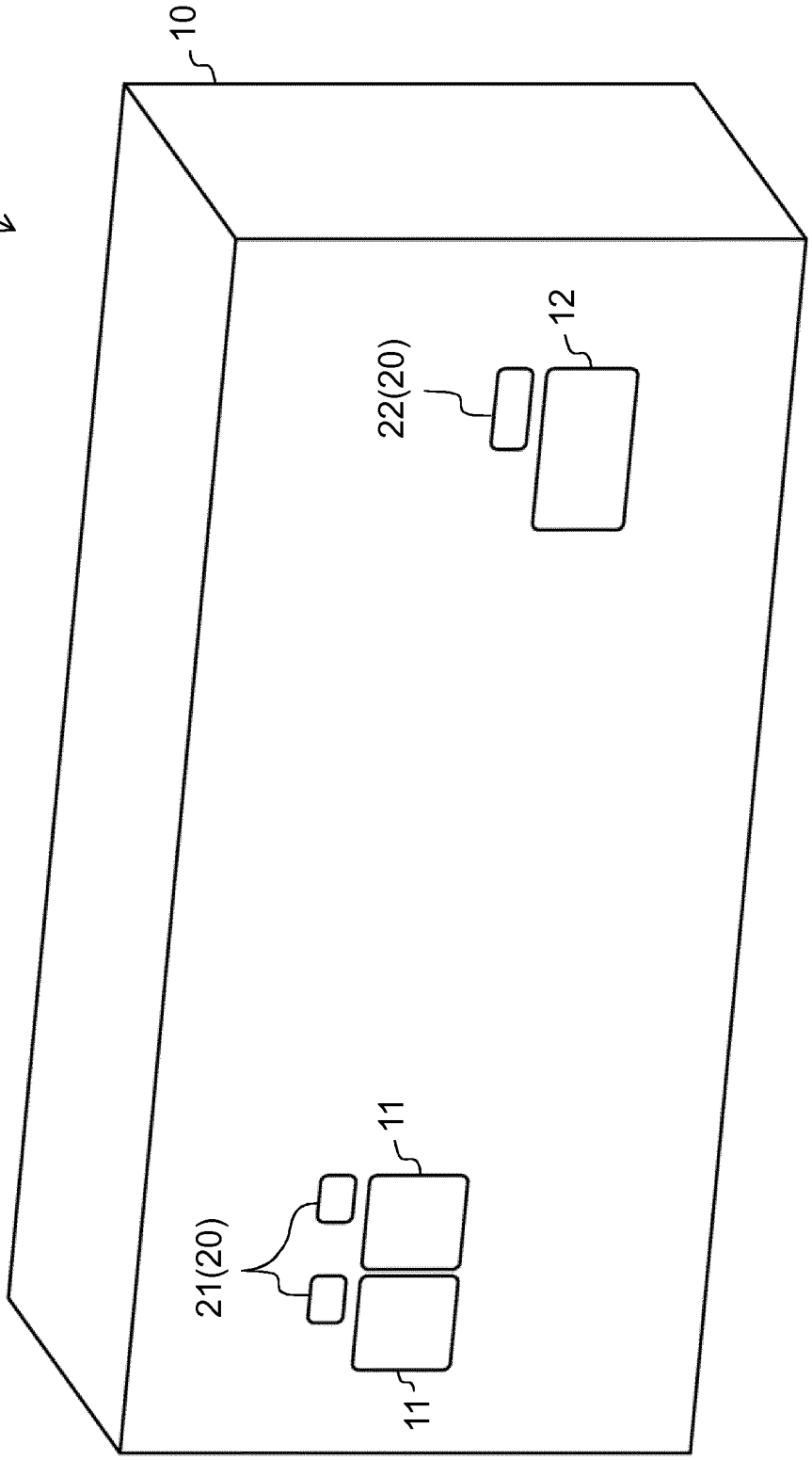
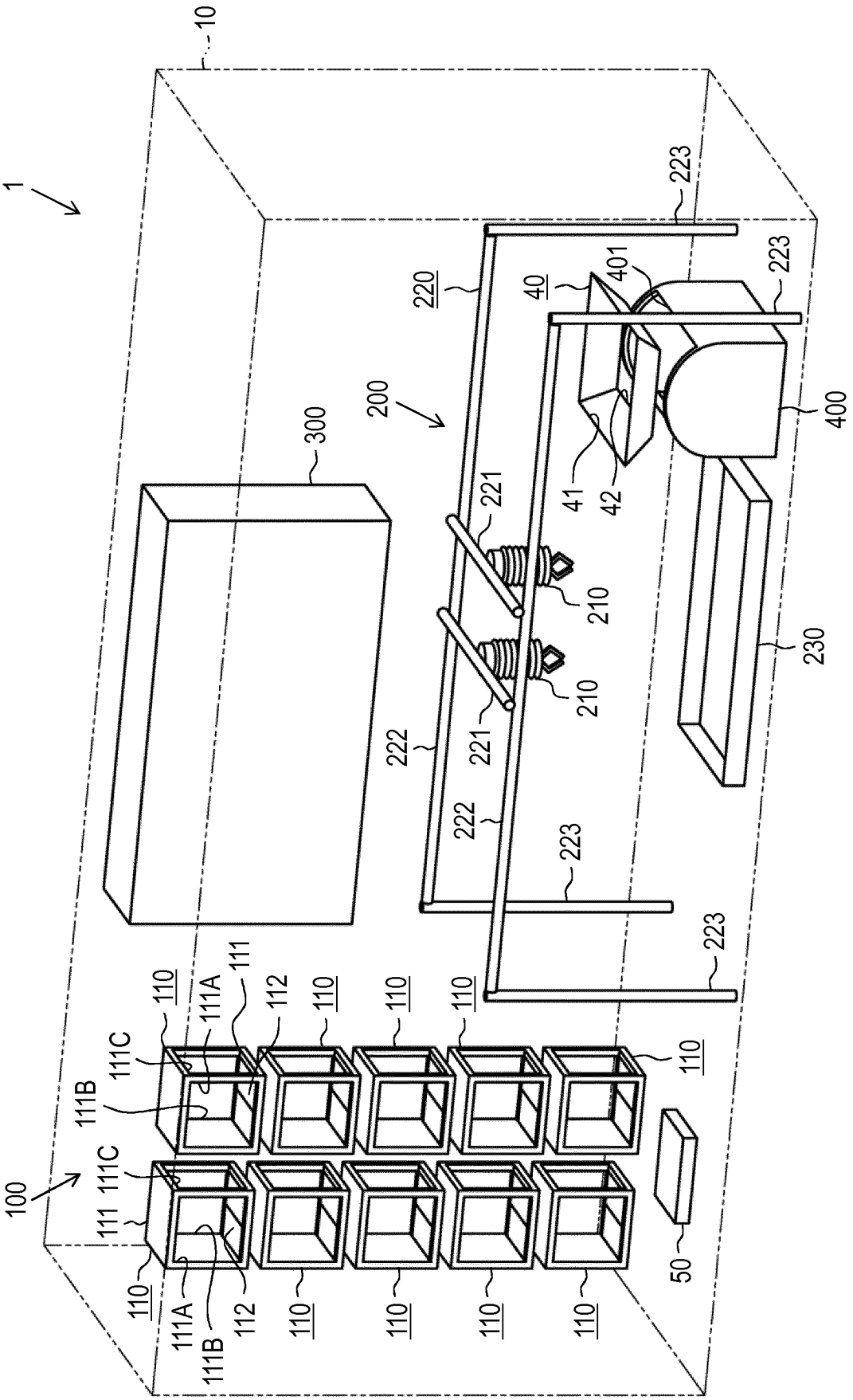


FIG. 2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110
111
111A
111B
111C
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300
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401
41
42
50

FIG. 3

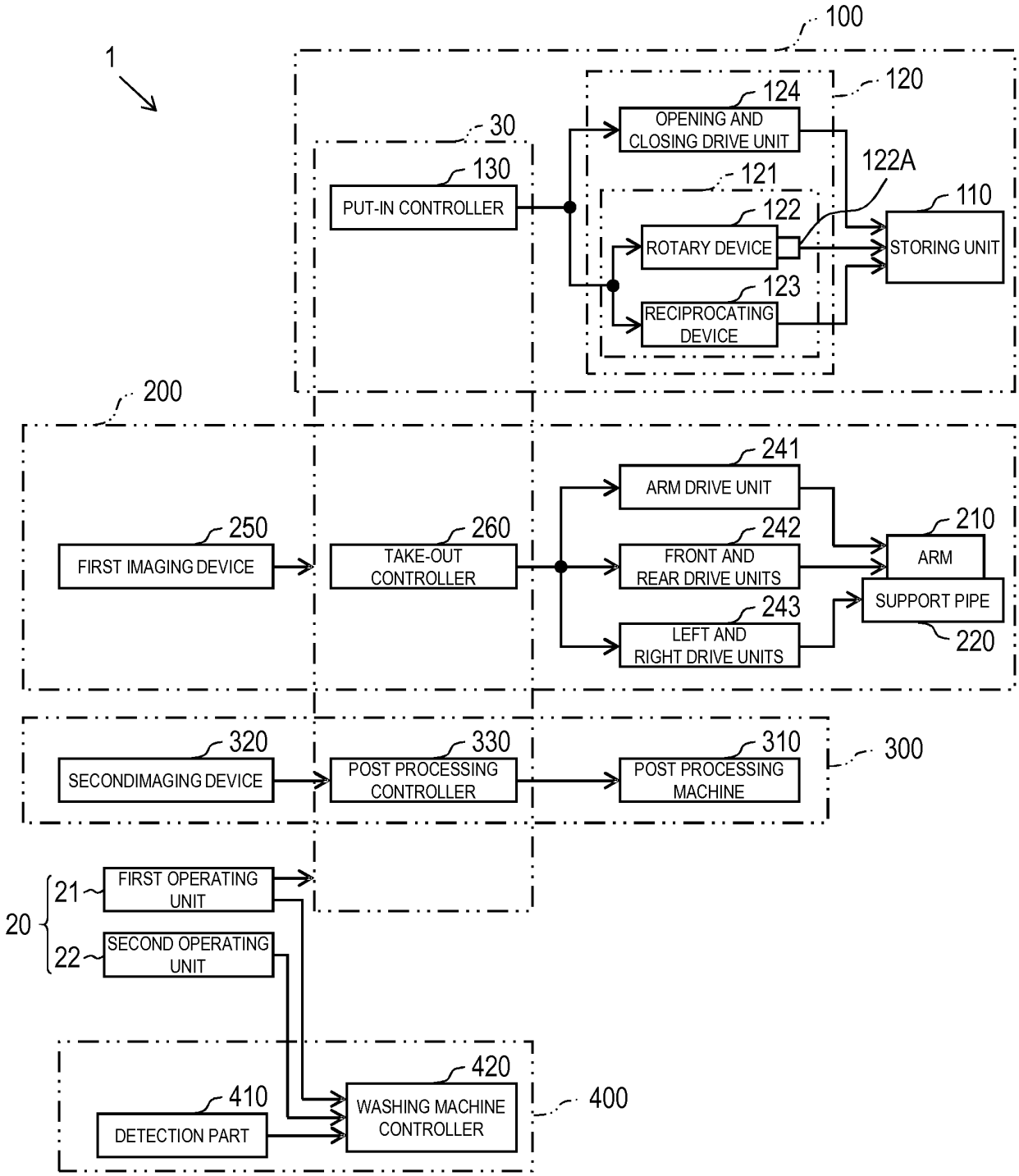

1
100
120
124
OPENING AND CLOSING DRIVE UNIT
30
130
PUT-IN CONTROLLER
121
122A
122
ROTARY DEVICE
110
STORING UNIT
123
RECIPROCATING DEVICE
200
241
ARM DRIVE UNIT
250
FIRST IMAGING DEVICE
260
TAKE-OUT CONTROLLER
242
FRONT AND REAR DRIVE UNITS
210
ARM
SUPPORT PIPE
243
LEFT AND RIGHT DRIVE UNITS
220
320
SECONDIMAGING DEVICE
330
POST PROCESSING CONTROLLER
310
POST PROCESSING MACHINE
300
20
21
FIRST OPERATING UNIT
22
SECOND OPERATING UNIT
420
410
DETECTION PART
WASHING MACHINE CONTROLLER
400

FIG. 4

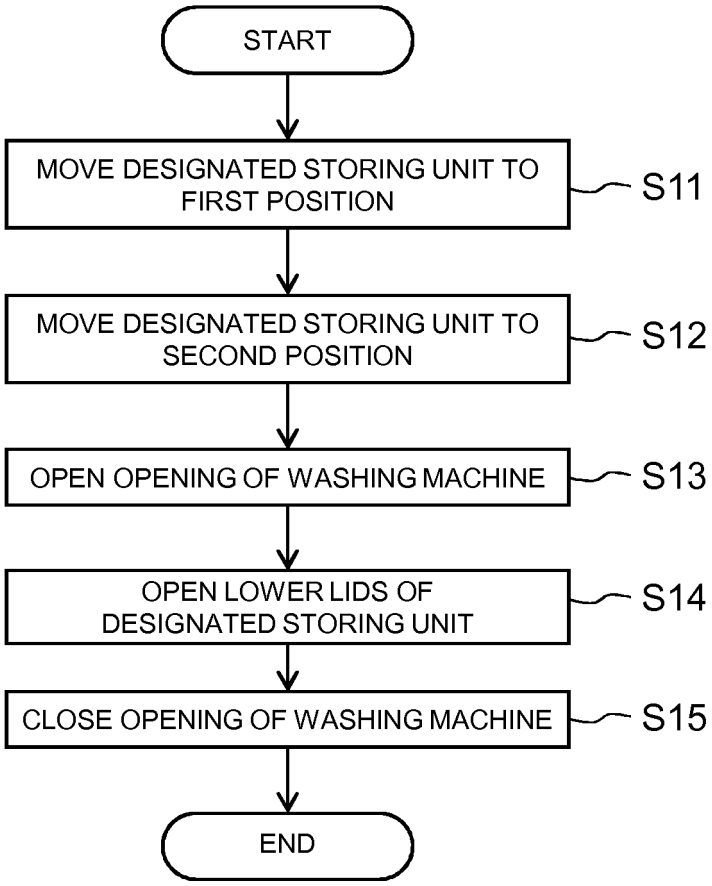

START
MOVE DESIGNATED STORING UNIT TO FIRST POSITION
S11
MOVE DESIGNATED STORING UNIT TO SECOND POSITION
S12
OPEN OPENING OF WASHING MACHINE
S13
OPEN LOWER LIDS OF DESIGNATED STORING UNIT
S14
CLOSE OPENING OF WASHING MACHINE
S15
END

FIG. 5

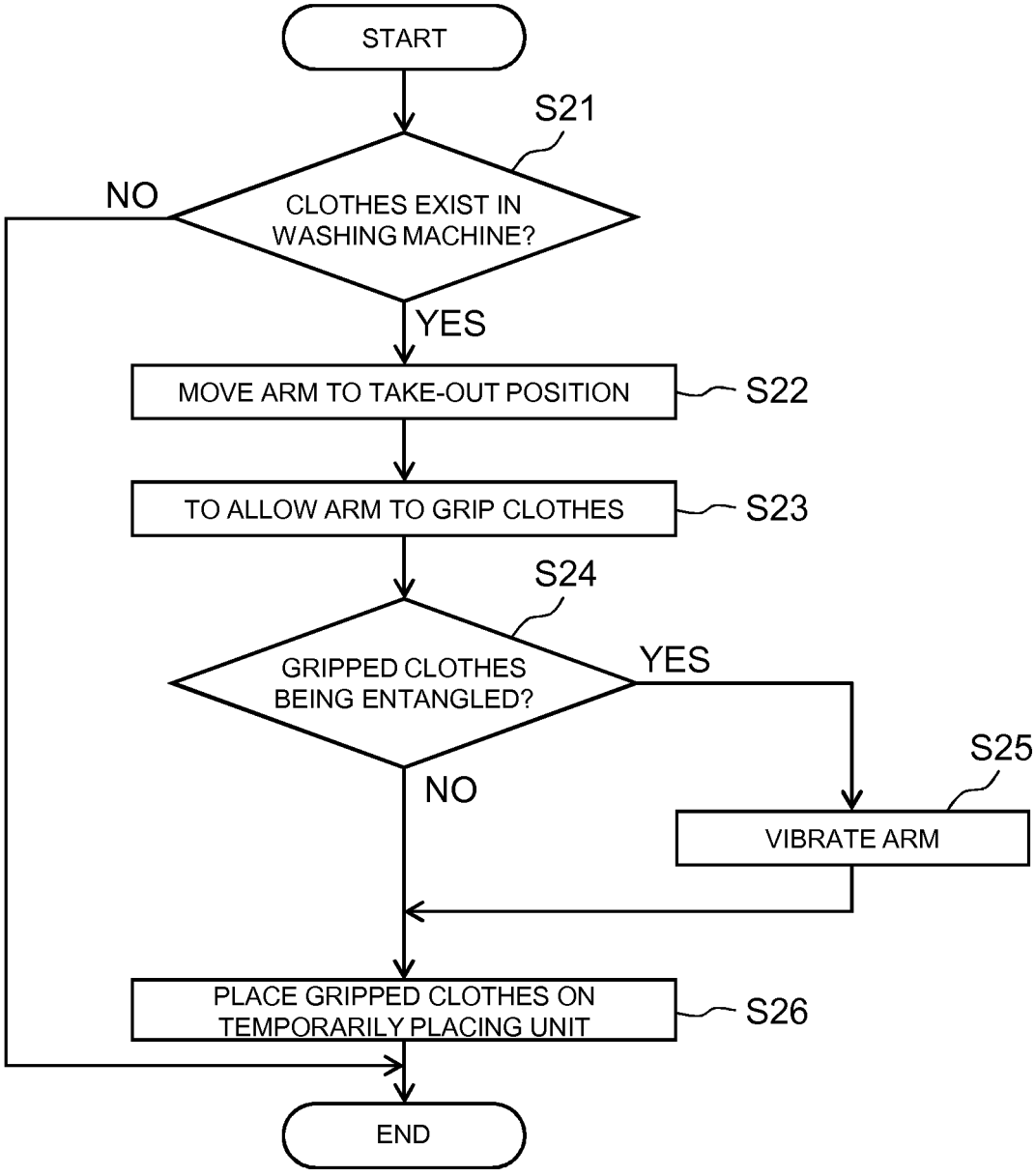
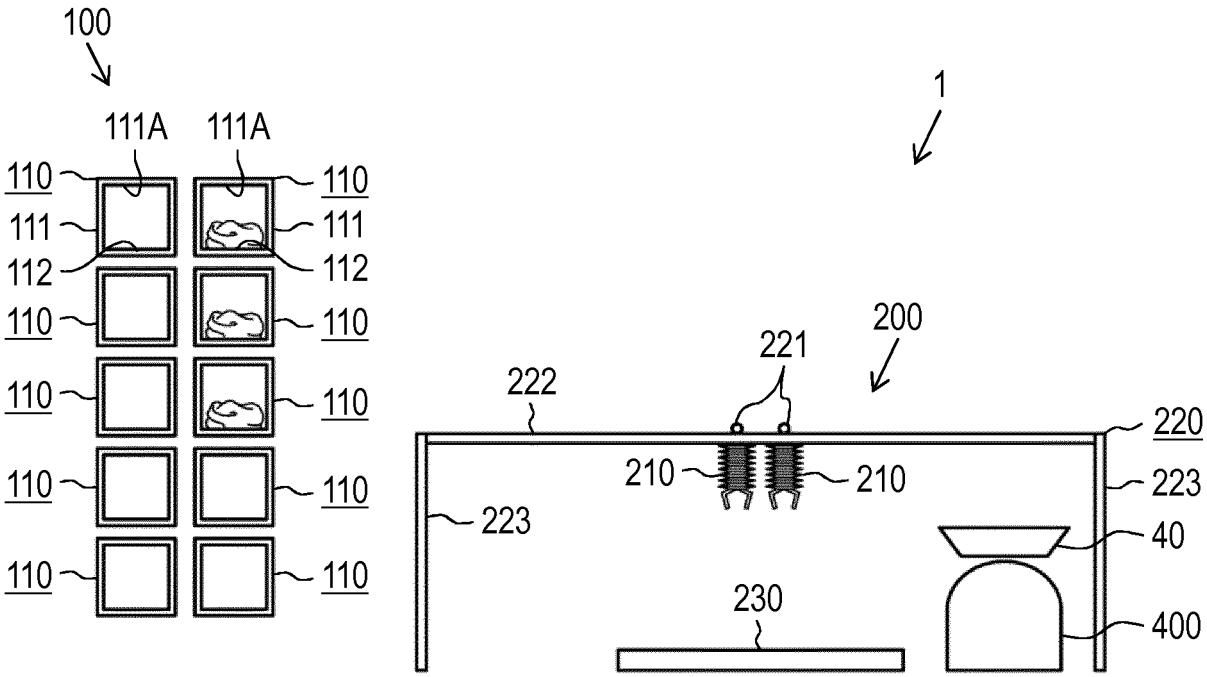

START
S21
CLOTHES EXIST IN WASHING MACHINE?
NO
YES
MOVE ARM TO TAKE-OUT POSITION
S22
TO ALLOW ARM TO GRIP CLOTHES
S23
S24
GRIPPED CLOTHES BEING ENTANGLED?
YES
NO
S25
VIBRATE ARM
PLACE GRIPPED CLOTHES ON TEMPORARILY PLACING UNIT
S26
END

FIG. 6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111A
110
111
112
1
200
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222
220
210
223
40
230
400

FIG. 7

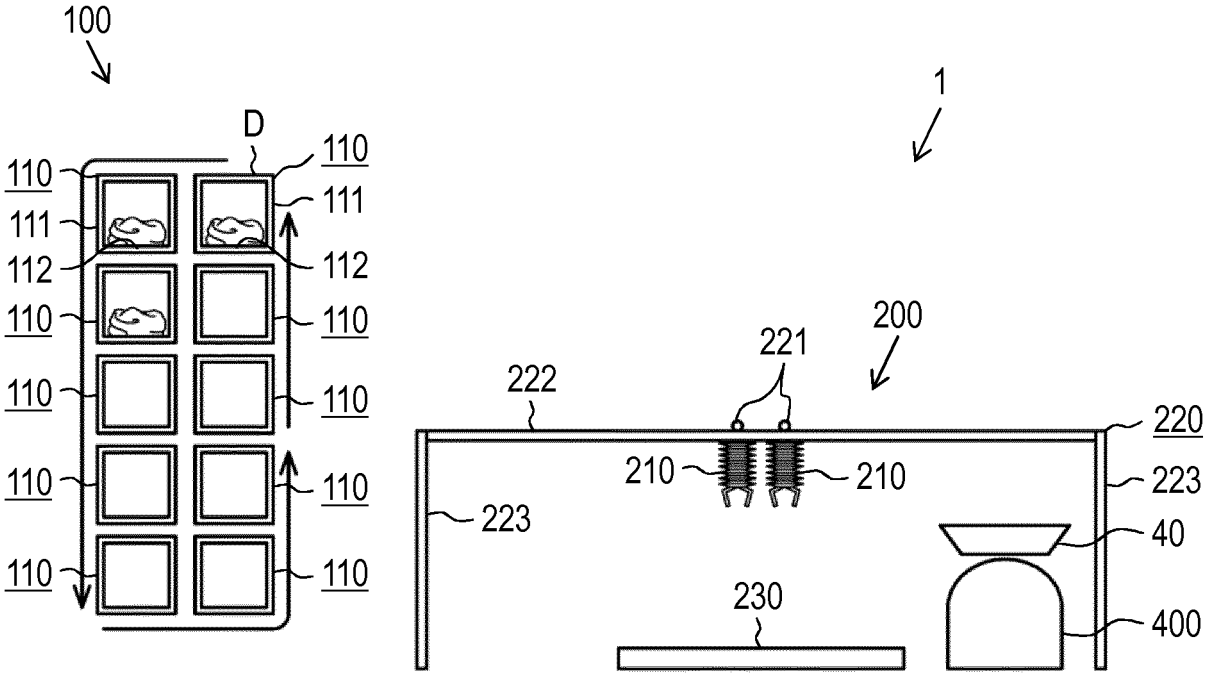
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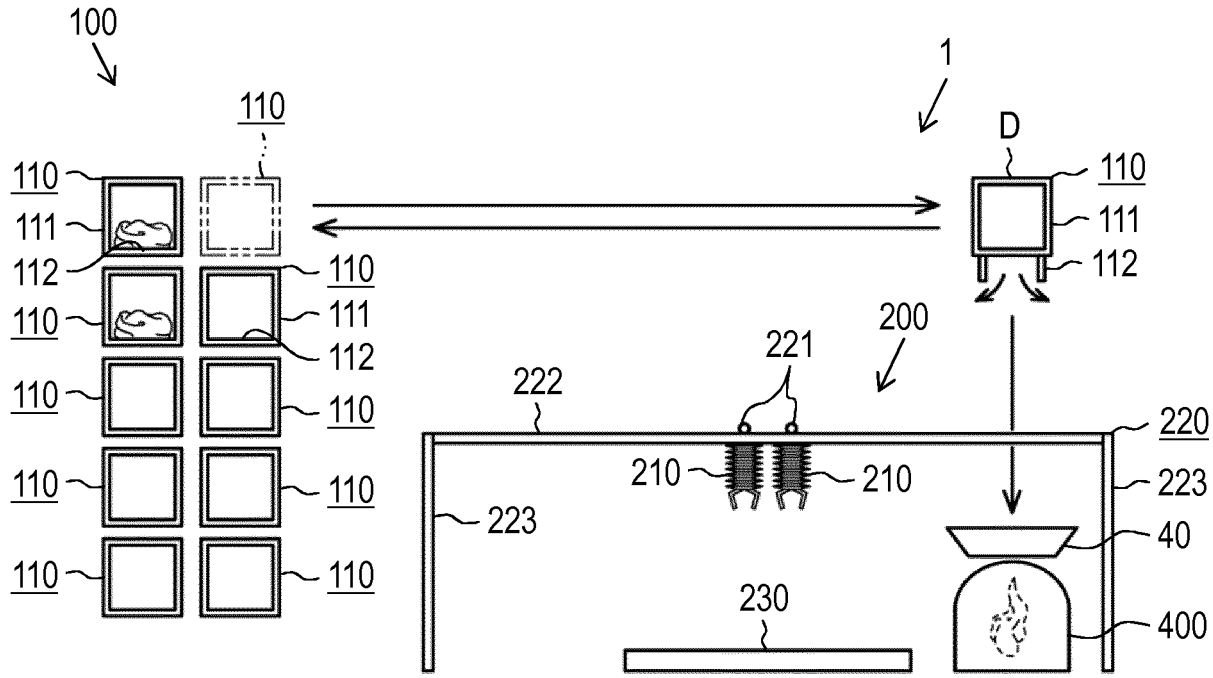
FIG. 8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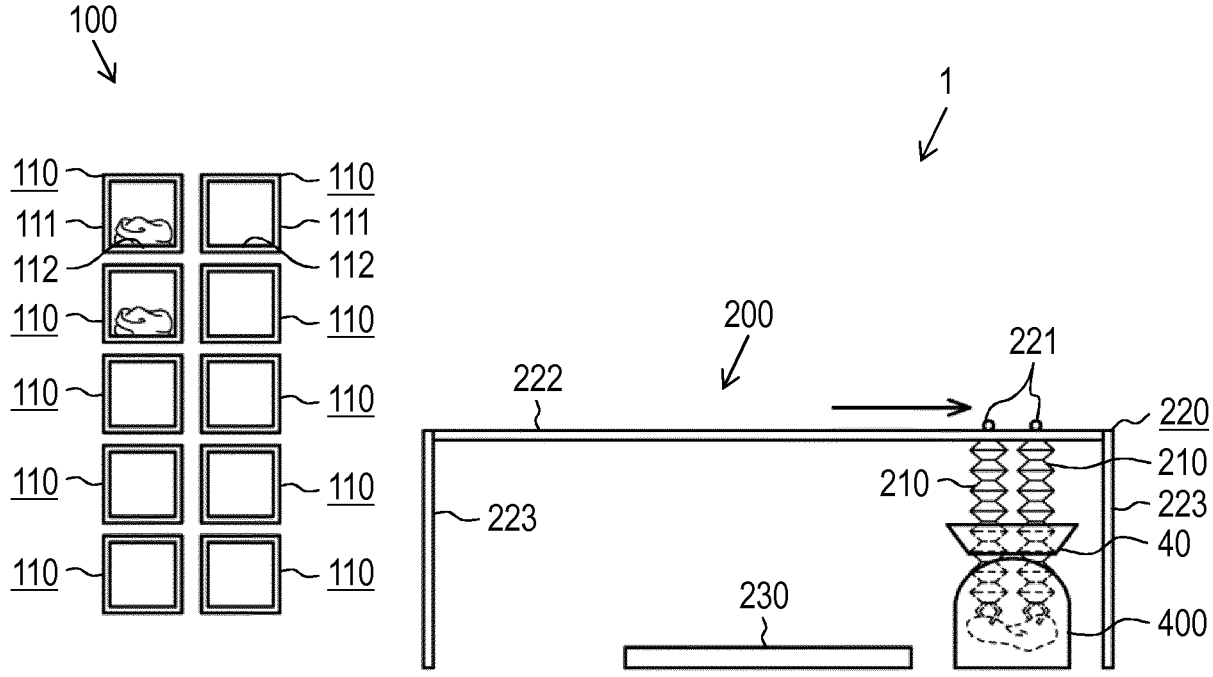
400

FIG. 9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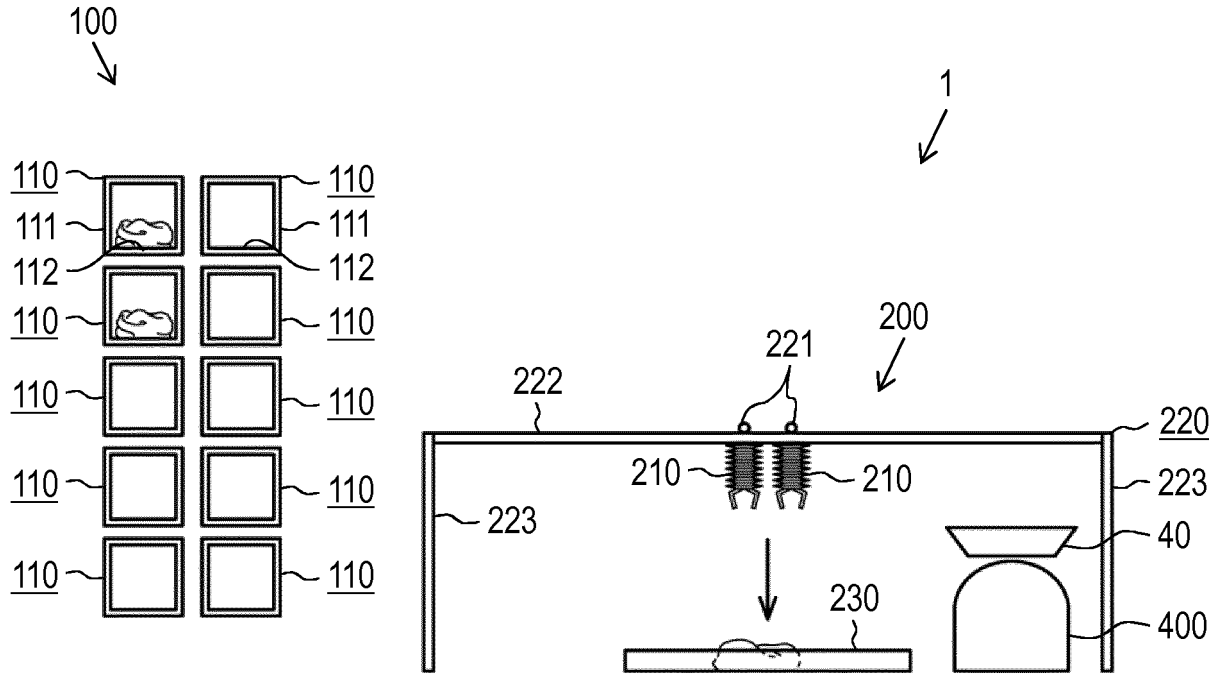
110
1
200
221
222
220
210
210
223
223
40
230
400

FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/004491

A. CLASSIFICATION OF SUBJECT MATTER
D06F95/00(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)
D06F95/00

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 1996-2016
Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP 5-213410 A (Mitsubishi Heavy Industries, Ltd.), 24 August 1993 (24.08.1993), paragraphs [0001] to [0009], [0013]; fig. 1 to 9 (Family: none)	1-3,5,11 4,6,8-10 7
Y A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 61685/1984(Laid-open No. 173281/1985) (Hitachi Plant Engineering & Construction Co., Ltd.), 16 November 1985 (16.11.1985), page 4, lines 8 to 12; fig. 1 (Family: none)	4 1-3,5-11

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

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 December 2016 (16.12.16)	10 January 2017 (10.01.17)
Name and mailing address of the ISA/ Japan Patent Office 3-4-3,Kasumigaseki,Chiyoda-ku, Tokyo 100-8915,Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2016/004491

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 61684/1984(Laid-open No. 173280/1985) (Hitachi Plant Engineering & Construction Co., Ltd.), 16 November 1985 (16.11.1985), page 4, lines 10 to 16; fig. 1 (Family: none)	4 1-3,5-11
Y A	JP 2005-271181 A (Fujinon Corp.), 06 October 2005 (06.10.2005), paragraphs [0001] to [0007]; fig. 1 to 5 (Family: none)	6,8-10 1-5,7,11
Y A	JP 2009-279700 A (Purex Corp.), 03 December 2009 (03.12.2009), paragraph [0059]; fig. 1 to 6 (Family: none)	6,8-10 1-5,7,11
Y A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 117607/1988(Laid-open No. 40400/1990) (Sanden Corp.), 19 March 1990 (19.03.1990), page 7, line 6 to page 8, line 8; page 10, line 6 to page 12, line 16; fig. 1 to 6 (Family: none)	8-10 1-7,11
Y A	JP 2007-117336 A (Tosen Machinery Corp.), 17 May 2007 (17.05.2007), paragraphs [0002] to [0003]; fig. 4 (Family: none)	9 1-8,10-11
Y A	JP 2014-202700 A (Purex Corp.), 27 October 2014 (27.10.2014), paragraphs [0052] to [0056]; fig. 6 (Family: none)	10 1-9,11

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2006255195 A **[0004] [0024]**
- JP 5299934 B **[0042]**