

BOX LUNCH VENDING MACHINE

TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of vending machines, and specifically to a box lunch vending machine.

BACKGROUND

[0002] A box lunch vending machine is internally provided with a multilayer storage shelf, each layer of the storage shelf is correspondingly provided with a liquid guiding groove, and the liquid guiding groove contains hot water. When a box lunch needs to be heated, the box lunch on the storage shelf may be immersed into the hot water, and after the heating of the box lunch is complete, the hot water in the liquid guiding groove is drained through a drain pipe. In the prior art, the draining process of each liquid guiding groove is independent with each other, so the structure of the pipes is complex and the assembly difficulty is high.

SUMMARY

[0003] Based on the above, it is necessary to provide a box lunch vending machine by aiming at a problem that drain pipes are complex.

[0004] A box lunch vending machine comprises:

[0005] a box body;

[0006] a storage shelf, which is arranged in the box body and comprises a plurality of spaced supporting mechanisms, wherein each supporting mechanism comprises a plurality of storage units used for arranging box lunches; and

[0007] a heating device, which is arranged in the box body and comprises the first liquid guiding groove group and the second liquid guiding groove group, wherein the first liquid guiding groove group and the second liquid guiding groove group both comprise a plurality of liquid guiding grooves, the liquid guiding grooves are in one-to-one correspondence with the supporting mechanisms, a connecting pipe is arranged between every two adjacent liquid guiding grooves in the first liquid guiding groove group or the second liquid guiding groove group, the first liquid guiding groove group and the second liquid guiding groove group are respectively provided with a valve assembly, the valve assembly comprises a plurality of plugs, a pull rod and a power element, a liquid outlet is opened in a position, corresponding to the

upper end of the connecting pipe, of each liquid guiding groove, the plug is arranged at the liquid outlet, the liquid guiding groove is provided with a support plate, the power element is arranged on the support plate and is connected with the pull rod, each plug is connected with the pull rod, and the power element can drive each plug to be plugged in or pulled out of the liquid outlet.

[0008] In the above box lunch vending machine, all of the liquid guiding grooves are divided into the first liquid guiding groove group and the second liquid guiding groove group. Due to arrangement of the connecting pipe between every two adjacent liquid guiding grooves in the first liquid guiding groove group or the second liquid guiding groove group, the liquid guiding grooves can be communicated with each other when the plug is pulled out of the liquid outlet. Due to the valve assembly in the first liquid guiding groove group or the second liquid guiding groove group, synchronous control of the heat-conducting medium discharging processes of the plurality of liquid guiding grooves may be realized, so the high efficiency is achieved. Furthermore, the heat-conducting medium discharging processes of the first liquid guiding groove group or the second liquid guiding groove group are independent with each other by grouping the plurality of liquid guiding grooves, so the efficiency can be effectively improved.

[0009] In one embodiment, the liquid guiding groove comprises a liquid inlet and an overflow pipe, the liquid inlet is formed on the support plate, and the overflow pipe is arranged at the bottom wall of the liquid guiding groove, the overflow pipe of one liquid guiding groove is communicated with the liquid inlet of another adjacent liquid guiding groove in the first liquid guiding groove group or the second liquid guiding groove group.

[0010] In one embodiment, the box lunch vending machine further comprises a liquid storage tank and a pump body, and the liquid storage tank is arranged below the heating device and for containing the heat-conducting medium, the liquid inlet of the liquid guiding groove at the top is connected with a liquid pumping pipe of the pump body in the first liquid guiding groove group or the second liquid guiding groove group, the overflow pipe of the liquid guiding groove at the bottom is communicated with the liquid storage tank. In one embodiment, the liquid guiding groove comprises a bottom wall, the first annular side wall and the second annular side wall, the first annular side wall and the second annular side wall are arranged on the bottom wall, a diaphragm is arranged in the liquid guiding groove, the diaphragm is sequentially connected with the first annular side wall, the bottom wall and the second annular side wall, and the liquid inlet and the overflow pipe are respectively located on the two sides of the diaphragm.

[0011] In one embodiment, the box lunch vending machine further comprises a lifting device, the lifting device is used for driving the storage shelf to lift up and down, the supporting

mechanisms can carry box lunches to move down in order that the box lunches are immersed into the corresponding liquid guiding grooves when the lifting device drives the storage shelf to lift down, and when the lifting device drives the storage shelf to lift up, the supporting mechanisms can carry the box lunches to move up in order that the box lunches leave the liquid guiding grooves and face to the exits.

[0012] In one embodiment, the lifting device comprises the first fixed plate, a movable plate, the second fixed plate, a plurality of supporting poles, a screw rod and a driving assembly, the first fixed plate is arranged at the box body, the plurality of supporting poles are arranged on the first fixed plate, the movable plate is sleeved on the supporting poles, the second fixed plate is connected with one end, away from the first fixed plate, of each supporting pole, the screw rod is respectively rotationally connected with the first fixed plate and the second fixed plate and is in threaded matching with the movable plate, the driving assembly is used for driving the screw rod to rotate so as to drive the movable plate to lift up and down along the supporting poles, the movable plate is connected with a lifting rod, and the lifting rod is connected with the storage shelf.

[0013] In one embodiment, the lifting device further comprises a detecting assembly, the detecting assembly comprises two sensing elements and detecting strips, the detecting strips are arranged on the movable plate, the two sensing elements are respectively arranged on the first fixed plate and the second fixed plate, the detecting strips can move along with the movable plate and enter the detection regions of the sensing elements.

[0014] In one embodiment, the lifting device further comprises a limit block, the limit block is arranged on the first fixed plate and/or the second fixed plate and is sleeved on the supporting pole, when the movable plate moves to the right place, the limit block can limit the movable plate.

[0015] In one embodiment, the box lunch vending machine further comprises:

[0016] a rotating device, which comprises a motor and a transmission assembly, wherein the motor can drive the storage shelf to rotate by the transmission assembly;

[0017] a detecting device, which comprises a detecting element and a sensing plate, wherein the detecting element comprises the first sensor and the second sensor that are arranged at an interval, the sensing plate can rotate synchronously along with the storage shelf, a plurality of locating teeth are circumferentially arranged on the sensing plate, and each locating tooth corresponds to one storage unit; each locating tooth comprises the first locating tooth and the second locating tooth, the first locating tooth can be detected by one of the first sensor and the second sensor, and the second locating tooth can be detected by the first sensor and the second

sensor at the same time;

[0018] the number of the first locating tooth is one, the number of the second locating teeth is two or more, in the initial state, the first locating tooth is located in the detection region of the first sensor or the second sensor, and one storage unit is aligned to the exit; or

5 [0019] the number of the first locating teeth is two or more, the number of the second locating tooth is one, in the initial state, the second locating tooth is located in the detection region of the first sensor and the detection region of the second sensor at the same time, and one storage unit is aligned to the exit.

10 [0020] In one embodiment, the transmission assembly comprises the first transmission part and the second transmission part that are meshed with each other, the output end of the motor is connected with the first transmission part, the second transmission part and the storage shelf are coaxially arranged, a plurality of arc slots are formed in the sensing plate, and a plurality of connecting pieces penetrate through the arc slots in order to fix the sensing plate to the second transmission part.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG 1 is a structural schematic diagram of a box lunch vending machine according to one embodiment.

20 [0022] FIG 2 is a structural schematic diagram of a heating device in the box lunch vending machine shown in FIG 1.

[0023] FIG 3 is a structural schematic diagram of a liquid guiding groove in the heating device shown in FIG 2.

[0024] FIG 4 is a structural schematic diagram of a lifting device in the box lunch vending machine shown in FIG 1.

25 [0025] FIG 5 is a structural schematic diagram of a rotating device and a detecting device in the box lunch vending machine shown in FIG 1.

[0026] FIG 6 is a structural schematic diagram of the first embodiment of a sensing plate in the detecting device shown in FIG 5.

30 [0027] FIG 7 is a structural schematic diagram of the second embodiment of a sensing plate in the detecting device shown in FIG 5.

DESCRIPTION OF THE EMBODIMENTS

[0028] To facilitate understanding the present disclosure, the present disclosure is described more fully hereinafter with reference to the accompanying drawings. Preferable embodiments of the present disclosure are presented in the accompanying drawings. The present disclosure may, however, be embodied in many different forms and should not be limited to the embodiments set forth herein. Rather, an objective of providing these embodiments is to understand content disclosed in the present disclosure more thoroughly and comprehensively.

[0029] It should be noted that when an element is referred to as being “fixed” to another element, the element can be directly arranged on another element or there may be an intermediate element. When an element is referred to as being “connected” to another element, the element can be directly connected to the other element or there may be an intermediate element simultaneously. As used herein, the terms “internal”, “external”, “left”, “right” and other similar expressions are for illustrative purposes only, and should not be construed to be the only implementation.

[0030] Referring to FIG 1, FIG 2 and FIG 3, a box lunch vending machine 1000 comprises a storage shelf 100, a heating device 300 and a box body 500. The box body 500 is provided with a plurality of exits 510, the storage shelf 100 is arranged in the box body 500, the storage shelf 100 is provided with multiple layers of supporting mechanisms 20, and the supporting mechanisms 20 are used for arranging box lunches 200. The heating device 300 is arranged in the box body 500, the heating device 300 comprises the first liquid guiding groove group 300a and the second liquid guiding groove group 300b, the first liquid guiding groove group 300a and the second liquid guiding groove group 300b both comprise a plurality of liquid guiding grooves 310, the liquid guiding grooves 310 and the supporting mechanisms 20 are arranged in one-to-one correspondence, and the liquid guiding grooves 310 contain heat-conducting medium for heating the box lunches 200. A connecting pipe 330 is arranged between every two adjacent liquid guiding grooves 310 in the first liquid guiding groove group 300a or the second liquid guiding groove group 300b, the first liquid guiding groove group 300a and the second liquid guiding groove group 300b are respectively provided with a valve assembly 320, the valve assembly 320 comprises a plurality of plugs 321, a pull rod 322 and a power element 323, the connecting pipe 330 is arranged between every two adjacent liquid guiding grooves 310, a liquid outlet 316 is formed in a position, corresponding to the upper end of the corresponding connecting pipe 330, of each liquid guiding groove 310, a plug 321 is arranged in the liquid outlet 316 of each liquid guiding groove 310, each liquid guiding groove 310 is provided with a support plate 311, the power element 323 is arranged on the support plate 311 and is connected with the pull rod 322, each plug 321 is connected with the pull rod 322, and the power element

323 can drive each plug 321 to be plugged in or pulled out of the liquid outlet 316.

[0031] In the above box lunch vending machine 1000, all of the liquid guiding grooves 310 are divided into the first liquid guiding groove group 300a and the second liquid guiding groove group 300b. In the first liquid guiding groove group 300a or the second liquid guiding groove group 300b, due to arrangement of the connecting pipe 330 between every two adjacent liquid guiding grooves 310, the liquid guiding grooves 310 can be communicated with each other when the plug 321 is pulled out of the liquid outlet 316. Due to the valve assembly 320 in the first liquid guiding groove group 300a or the second liquid guiding groove group 300b, synchronous control of the heat-conducting medium discharging processes of the plurality of liquid guiding grooves 310 may be realized. Furthermore, the heat-conducting medium discharging processes of the first liquid guiding groove group 300a or the second liquid guiding groove group 300b are independent with each other by grouping the plurality of liquid guiding grooves 310, so the efficiency can be effectively improved.

[0032] The power element 323 may be an air cylinder, a stepping motor and the like. The liquid outlet 316 is formed in the bottom wall of each liquid guiding groove 310 in order to ensure that the heat-conducting medium in each liquid guiding groove 310 can be completely discharged.

[0033] Each liquid guiding groove 310 comprises a liquid inlet 313 and an overflow pipe 314, the liquid inlet 313 is formed in the support plate 311, and the overflow pipe 314 is arranged at the bottom wall of the liquid guiding groove 310, so the overflow pipe 314 of one liquid guiding groove 310 is communicated with the liquid inlet 313 of another adjacent liquid guiding groove 310 in the first liquid guiding groove group 300a or the second liquid guiding groove group 300b. For example, when the box lunches 200 corresponding to the first liquid guiding groove group 300a need to be heated, the heat-conducting medium is filled into the liquid guiding groove 310 located at the top in the first liquid guiding groove group 300a, and the heat-conducting medium flows into the next liquid guiding groove 310 through the overflow pipe 314 under gravity. Because the first liquid guiding groove group 300a and the second liquid guiding groove group 300b are independent with each other, the injection operation can be performed simultaneously, and therefore improving the heating efficiency.

[0034] The box lunch vending machine 1000 further comprises a liquid storage tank (which is not shown in the drawings) and a pump body, the liquid storage tank is arranged below the heating device 300 and is used for containing the heat-conducting medium, the liquid inlet 313 of the liquid guiding groove 310 at the top is connected with a liquid pumping pipe of the pump body in the first liquid guiding groove group 300a or the second liquid guiding groove group

300b, and the heat-conducting medium in the liquid storage tank is pumped into the liquid guiding groove 310 at the top by the pump body, so that the heat-conducting medium gradually flows from the liquid guiding groove 310 at the top to other liquid guiding grooves 310.

5 [0035] The overflow pipe 314 of the liquid guiding groove 310 at the bottom is communicated with the liquid storage tank. After the heating of the box lunches 200 in the first liquid guiding groove group 300a or the second liquid guiding groove group 300b is complete, the power element 323 drives the plug 321 to be pulled out of the liquid outlet 316 through the pull rod 322, the heat-conducting medium can flow from an upper liquid guiding groove 310 to a lower liquid guiding groove 310 and can also flow into the liquid storage tank through the
10 overflow pipe 314 of the liquid guiding groove 310 at the bottom. In other words, the heat-conducting medium may be recycled to the liquid storage tank through the liquid guiding grooves 310, thereby achieving cyclic utilization of the heat-conducting medium.

[0036] Referring to FIG 3, the support plate 311 is provided with a sleeve 312, and the plug 321 penetrates through the sleeve 312. The plug 321 is of a pipe structure, and the tail end of the
15 plug 321 forms a flange 321a; in one aspect, when the plug 321 plugs in the liquid outlet 316, the flange 321a is propped against the inner wall of the liquid guiding groove 310 so as to prevent the heat-conducting medium from leaking; in the other aspect, when the plug 321 moves upwards, the flange 321a is propped against the end part of the sleeve 312 so as to limit the plug 321. Furthermore, the arrangement of the sleeve 312 limits the moving process of the
20 plug 321 and also ensures the stability of the plug 321 in the moving process.

[0037] Furthermore, a screw penetrates through the plug 321 and is fixed to the pull rod 322 so that the plug 321 and the pull rod 322 are fixedly connected.

[0038] Each liquid guiding groove 310 comprises a bottom wall 310a, the first annular side wall 310b and the second annular side wall 310c, the first annular side wall 310b and the second
25 annular side wall 310c are arranged on the bottom wall 310a, a diaphragm 315 is arranged in the liquid guiding groove 310, the diaphragm 315 is sequentially connected with the first annular side wall 310b, the bottom wall 310a and the second annular side wall 310c, and the liquid inlet 313 and the overflow pipe 314 are respectively located on the two sides of the diaphragm 315. Due to such arrangement, after the upper liquid guiding groove 310 is full of the
30 heat-conducting medium, the heat-conducting medium may flow into the lower liquid guiding groove 310 so as to ensure that each liquid guiding groove 310 may be filled with the sufficient heat-conducting medium to heat the box lunch 200.

[0039] In some embodiments, an overflow hole is formed in the side wall of the overflow pipe 314, referring to FIG 3, the liquid guiding groove 310 further comprises an overflow plate

317, the overflow plate 317 is sequentially connected with the second annular side wall 310c, the bottom wall 310a and the diaphragm 315, and the height of the overflow plate 317 is smaller than the height of the diaphragm 315, so the heat-conducting medium can flow into the lower liquid guiding groove 310 when the liquid level of the liquid guiding groove 310 is over the height of the overflow plate 317, and due to the arrangement of the overflow plate 317, the liquid guiding groove 310 can contain sufficient heat-conducting medium to heat the box lunch. In the other embodiments, the height of the overflow pipe 314 is designed to be smaller than the height of the diaphragm 315, so no overflow hole needs to be formed in the overflow pipe 314, wherein when the liquid level of the liquid guiding groove 310 is over the height of the overflow pipe 314, the heat-conducting medium can flow into the lower liquid guiding groove 310.

[0040] Referring to FIG 1 and FIG 4, the box lunch vending machine 1000 further comprises a lifting device 400. The lifting device 400 comprises the first fixed plate 410, a movable plate 420, the second fixed plate 430, a plurality of supporting poles 440, a screw rod 450 and a driving assembly 460, the first fixed plate 410 is arranged at the box body, the plurality of supporting poles 440 are arranged on the first fixed plate 410, the movable plate 420 is sleeved on the supporting poles 440, the second fixed plate 430 is connected with one end, away from the first fixed plate 410, of each supporting pole 440, the screw rod 450 is respectively rotationally connected with the first fixed plate 410 and the second fixed plate 430 and is in threaded matching with the movable plate 420, the driving assembly 460 is used for driving the screw rod 450 to rotate so as to drive the movable plate 420 to lift up and down along the supporting poles 440, the movable plate 420 is connected with a lifting rod 470, and the lifting rod 470 is connected with the storage shelf 100. The lifting device 400 is arranged at the top of the box body, as shown in FIG 1 and FIG 4, the central shaft 10 is arranged at the center of the storage shelf 100, and the lifting rod 470 is fixedly connected with the central shaft 10.

[0041] Specifically, the driving assembly 460 drives the screw rod 450 to rotate, the screw rod 450 is in threaded matching with the movable plate 420 so that the screw rod 450 can drive the movable plate 420 to lift up and down, and the storage shelf 100 is connected with the movable plate 420 by the lifting rod 470 so that the storage shelf 100 lifts up or down when the movable plate 420 lifts up and down. The supporting poles 440 is used for fixing the relative positions of the first fixed plate 410 and the second fixed plate 430 and guiding the movable plate 420. It should be understood that the number of the supporting poles 440 is four and the four supporting poles 440 are symmetrically arranged on the first fixed plate 410 or the second fixed plate 430.

[0042] The driving assembly 460 comprises the first gear 461, the second gear 462 and a rotating motor 463, the first gear 461 and the second gear 462 are mutually meshed, the output end of the rotating motor 463 is connected with the first gear 461, and the second gear 462 and the screw rod 450 are coaxially arranged. The rotating motor 463 is a speed reduction motor and
5 can reduce the speed when the movable plate 420 is close to the right position in the lifting up or down process, thereby preventing sharp shake caused by sudden stop.

[0043] In one embodiment, the lifting device 400 further comprises a detecting assembly 480, the detecting assembly 480 comprises two sensing elements 481 and detecting strips 482, the detecting strips 482 are arranged on the movable plate 420, and the detecting strips 482 can
10 move along with the movable plate 420 and enter detection regions of the sensing elements 481 to judge whether the movable plate 420 moves to the right position. The two sensing elements 481 are respectively arranged on the first fixed plate 410 and the second fixed plate 430. The sensing elements 481 are communicated with a controller. When the sensing elements 481 detect a signal that the movable plate 420 lifts up or down to the right position, the signal is
15 transmitted to the controller, and the controller transmits an operation stopping signal to the driving assembly 460, thereby achieving real-time monitoring of a motion state of the movable plate 420, and preventing a situation that the movable plate 420 moves out of a maximum motion range to cause that the storage shelf 100 impacts other components in the box body 500.

[0044] It should be noted that one detecting strip 482 may be provided, the projections of the two sensing elements 481 at the top of the box body 500 are superposed, and the detecting strip 482 enters a detection region of a corresponding sensing element 481 when the detecting strip 482 moves up or down along with the movable plate 420. Or a detecting strip 482 is respectively arranged corresponding to each sensing element 481.
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[0045] The lifting device 400 further comprises limit blocks 490, the limit blocks 490 are sleeved on the supporting poles 440, and the limit blocks 490 are connected with the first fixed plate 410, the second fixed plate 430 or the movable plate 420. When the movable plate 420 lifts up or down, the limit blocks 490 are clamped between the first fixed plate 410 (or the second fixed plate 430) and the movable plate 420 so as to limit the movable plate 420 and prevent the movable plate 420 from moving out of a maximum lifting stroke when the detecting
25 assembly 480 breaks down.
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[0046] The sensing element 481 comprises an optical signal sender and an optical signal receiver that are oppositely arranged, and the detecting strip 482 can block optical signals sent by the optical signal sender. A region between the optical signal sender and the optical signal receiver is the detection region, and when the detecting strip 482 enters the detection region, an

optical signal sent by the optical signal sender is blocked, the optical signal receiver cannot receive the optical signal, and then the sensing element 481 obtains a signal that the movable plate 420 moves to the right position.

5 [0047] It should be noted that the sensing element 481 further may be a contact sensor or a potentiometer.

[0048] In one embodiment, the first fixed plate 410 and the box body are integrated. In other words, the first fixed plate 410 is a part of the box body so that one end of each supporting pole 440 may be directly arranged on the box body.

10 [0049] Referring to FIG. 5, the box lunch vending machine 1000 further comprises a rotating device 600 and a detecting device 700, the rotating device 600 comprises a motor and a transmission assembly 620, and the motor can drive the storage shelf 100 to rotate by the transmission assembly 620. The detecting device 700 comprises a detecting element 710 and a sensing plate 720, the detecting element 710 comprises the first sensor 711 and the second sensor 712 that are arranged at an interval, the sensing plate 720 can rotate synchronously along
15 with the storage shelf 100, a plurality of locating teeth are circumferentially arranged on the sensing plate 720, and each locating tooth corresponds to one storage unit 22. Each locating tooth comprises the first locating tooth 721 and the second locating tooth 722, the first locating tooth 721 can be detected by one of the first sensor 711 and the second sensor 712, and the second locating tooth 722 can be detected by the first sensor 711 and the second sensor 712 at
20 the same time.

[0050] In the first embodiment, the number of the first locating tooth 721 is one, the number of the second locating teeth 722 is plurality, in the initial state, the first locating tooth 721 is located in the detection region of the first sensor 711 or the second sensor 712, and one storage unit 22 is aligned to the exit. The sensing plate 720 synchronously rotates along with the storage shelf 100, wherein when the detecting element 710 detects the second locating teeth 722, it represents that a next storage unit 22 reaches a position aligned to the exit, and the motor stops running in order to take the box lunch on the storage unit 22; and when the detecting element 710 detects the first locating tooth 721 again, it represents that the storage shelf 100 rotates for one cycle, that is, the box lunches on the all storage units 22 are taken away.

30 [0051] In the second embodiment, the number of the first locating teeth 721 is plurality, the number of the second locating tooth 722 is one, in the initial state, the second locating tooth 722 is located in the detection region of the first sensor 711 and the detection region of the second sensor 712 at the same time, and one storage unit 22 is aligned to the exit. The sensing plate 720 synchronously rotates along with the storage shelf 100, wherein when the detecting element 710

detects the first locating teeth 721, it represents that a next storage unit 22 reaches a position aligned to the exit, and the motor stops running in order to take the box lunch on the storage unit 22; and when the detecting element 710 detects the second locating tooth 722 again, it represents that the storage shelf 100 rotates for one cycle, that is, the box lunches on the all storage units 22 are taken away.

[0052] Referring to FIG 5, the transmission assembly 620 comprises the first transmission part 621 and the second transmission part 622 that are meshed with each other, the output end of the motor is connected with the first transmission part 621, the second transmission part 622 and the storage shelf 100 are coaxially arranged, as shown in FIG. 6 and FIG 7, a plurality of arc slots 723 are formed in the sensing plate 720, and a plurality of connecting pieces penetrate through the arc slots 723 in order to fix the sensing plate 720 to the second transmission part. The arrangement of the arc slots 723 helps to regulate the relative positions of the sensing plate 720 and the storage shelf 100 in order that the position of the first locating tooth 721/the second locating tooth 722 on the sensing plate 720 corresponds to the position of the storage unit 22 on the storage shelf 100.

[0053] The first sensor 711 and the second sensor 712 both comprise an optical signal sender and an optical signal receiver that are arranged relatively, and when the sensing plate 720 rotates, the first locating tooth 721/the second locating tooth 722 can selectively block an optical signal sent by the optical signal sender.

[0054] The technical features of the above-described embodiments can be arbitrarily combined. For simplicity, not all possible combinations of the technical features in the above embodiments are described. However, the combinations shall fall in the scope of the present disclosure as long as there is no contradiction among the combinations of these technical features.

[0055] The above embodiments are merely several embodiments of the present disclosure, and are relatively specific and detailed. However, the above embodiments should not be deemed as limitations to the scope of the present disclosure. It should be noted that, various changes and modifications made by a person of ordinary skill in the art without departing from the concepts of the present disclosure shall fall within the protection scope of the present disclosure. Therefore, the protection scope of the present disclosure should be defined by the appended claims.

Claims

1. A box lunch vending machine comprising:

a box body;

a storage shelf arranged in the box body and comprising a plurality of spaced supporting mechanisms, wherein each supporting mechanism comprises a plurality of storage units used for arranging box lunches;

a heating device arranged in the box body and comprising a first liquid guiding groove group and a second liquid guiding groove group, wherein the first liquid guiding groove group and the second liquid guiding groove group both comprise a plurality of liquid guiding grooves, the liquid guiding grooves are in one-to-one correspondence with the supporting mechanisms, a connecting pipe is arranged between every two adjacent liquid guiding grooves in the first liquid guiding groove group or the second liquid guiding groove group, the first liquid guiding groove group and the second liquid guiding groove group are respectively provided with a valve assembly, the valve assembly comprises a plurality of plugs, a pull rod and a power element, a liquid outlet is opened in a position of each liquid guiding groove corresponding to the upper end of the connecting pipe, the plug is arranged at the liquid outlet, the liquid guiding groove is provided with a support plate, the power element is arranged on the support plate and is connected with the pull rod, each plug is connected with the pull rod, and the power element drives each plug to be plugged in or pulled out of the liquid outlet.

2. The box lunch vending machine of claim 1, wherein the liquid guiding groove comprises a liquid inlet and an overflow pipe, the liquid inlet is formed in the support plate, and the overflow pipe is arranged at the bottom wall of the liquid guiding groove, the overflow pipe of one liquid guiding groove is communicated with the liquid inlet of another adjacent liquid guiding groove in the first liquid guiding groove group and/or the second liquid guiding groove group.

3. The box lunch vending machine of claim 2, wherein the box lunch vending machine further comprises a liquid storage tank and a pump body, and the liquid storage tank is arranged below the heating device and is used for containing the heat-conducting medium, the liquid inlet of the liquid guiding groove at the top is connected with a liquid pumping pipe of the pump body in the first liquid guiding groove group or the second liquid guiding groove group, the overflow pipe of the liquid guiding groove at the bottom is communicated with the liquid storage tank.

4. The box lunch vending machine of claim 3, wherein the liquid guiding groove comprises a

bottom wall, a first annular side wall and a second annular side wall, the first annular side wall and the second annular side wall are arranged on the bottom wall, a diaphragm is arranged in the liquid guiding groove, the diaphragm is sequentially connected with the first annular side wall, the bottom wall and the second annular side wall, and the liquid inlet and the overflow pipe are respectively located on both sides of the diaphragm.

5. The box lunch vending machine of claim 1, wherein the box lunch vending machine further comprises a lifting device, the lifting device is used for driving the storage shelf to lift up and down, the supporting mechanisms are capable of carrying box lunches to move down in order that the box lunches are immersed into the liquid guiding grooves when the lifting device drives the storage shelf to lift down, and when the lifting device drives the storage shelf to lift up, the supporting mechanisms are capable of carrying the box lunches to move up in order that the box lunches leave the liquid guiding grooves and face to the exit.

6. The box lunch vending machine of claim 5, wherein the lifting device comprises a first fixed plate, a movable plate, a second fixed plate, a plurality of supporting poles, a screw rod and a driving assembly, the first fixed plate is arranged at the box body, the plurality of supporting poles are arranged on the first fixed plate, the movable plate is sleeved on the supporting poles, the second fixed plate is connected with one end, away from the first fixed plate, of each supporting pole, the screw rod is respectively rotationally connected with the first fixed plate and the second fixed plate and is in threaded matching with the movable plate, the driving assembly is used for driving the screw rod to rotate so as to drive the movable plate to lift up and down along the supporting poles, the movable plate is connected with a lifting rod, and the lifting rod is connected with the storage shelf.

7. The box lunch vending machine of claim 6, wherein the lifting device further comprises a detecting assembly, the detecting assembly comprises two sensing elements and detecting strips, the detecting strips are arranged on the movable plate, the two sensing elements are respectively arranged on the first fixed plate and the second fixed plate, the detecting strips are capable of moving along with the movable plate and enter the detection regions of the sensing elements.

8. The box lunch vending machine of claim 6, wherein the lifting device further comprises a limit block, the limit block is arranged on the first fixed plate or the second fixed plate and is sleeved on the supporting pole, when the movable plate moves to the right place, the limit block limits the movable plate.

9. The box lunch vending machine of claim 1, wherein the box lunch vending machine further comprises:

a rotating device comprising a motor and a transmission assembly, wherein the motor drives the storage shelf to rotate by the transmission assembly;

a detecting device comprising a detecting element and a sensing plate, wherein the detecting element comprises a first sensor and a second sensor that are arranged at an interval, the sensing plate is capable of rotating synchronously along with the storage shelf, a plurality of locating teeth are circumferentially arranged on the sensing plate, and each locating tooth corresponds to one storage unit; each locating tooth comprises a first locating tooth and a second locating tooth, the first locating tooth is detected by one of the first sensor and the second sensor, and the second locating tooth is detected by the first sensor and the second sensor at the same time;

the number of the first locating tooth is one, the number of the second locating tooth is two or more, in the initial state, the first locating tooth is located in the detection region of the first sensor or the second sensor, and one storage unit is aligned to the exit; or

the number of the first locating tooth is two or more, the number of the second locating tooth is one, in the initial state, the second locating tooth is located in the detection region of the first sensor and the detection region of the second sensor at the same time, and one storage unit is aligned to the exit.

10. The box lunch vending machine of claim 9, wherein the transmission assembly comprises a first transmission part and a second transmission part that are meshed with each other, the output end of the motor is connected with the first transmission part, the second transmission part and the storage shelf are coaxially arranged, a plurality of arc slots are formed in the sensing plate, and a plurality of connecting pieces penetrate through the arc slots in order to fix the sensing plate to the second transmission part.