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TITLE OF INVENTION

Fruits vegetable washing machine for home restaurant cooking preparation

DESCRIPTION:

The field and background of the invention

Nowadays, there are lots of the domestic mechanical-electronics products, such as clothing washing machine, refrigerator, oven, vacuum cleaner, dish wishing machine etc. it certainly reduces the heavy duty of the house work. This invention is also trying to develop a convenient method for home and restaurant cooking preparation.

The function of the washing machine

The said machine acts like a kitchen assistant. The design of this invention is trying to provide one-stop solution for home and restaurant cooking preparation. The machine has a container with double hulls that presents two functions. The main one is for washing various shape's vegetables (hard or soft, leaves, beans or roots types), fruits, etc. The washing process includes water rinse, water soak, and wash by the air bubbles in water, ultrasonic/near ultrasonic frequency vibration cleaning (option). It is an environmental friendly and convenient method by using less chemical surfactants and detergents. The above process can be controlled by instrument system which integrated into cover lid acting as control panel. However some processes can be manual operation independently in order to save water for some situations. Another supplementary function in this machine is for cutting vegetables into regular length and shapes. Herein cutting process design is general and manual, but it can be further developed into semi-auto controlled process.

General description of the structure

The mechatronics part includes a two layer water container with the double hulls (Figure 1) in which have a special deck, cutting tool (see figure 2) and two long chambers. A control panel in the cover lid of the container includes the printed circuit board (PCB), microcontroller/transmitter, power supply box, push-buttons, actuators, displays, etc. It can be opened or closed (Figs 1 and 2). The air bubble cleaner, vibrate cleaner, influent and drain pipes,

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valves, sensor lines etc are integrated into the two long chambers and the space between the double hull.

The two layer container separated by a special deck with holes and cutting troughs in the low level of container, the deck is supported by four bases that are in the corner of the container. The deck also acts as a cutting board, water filter and drain outlets. The distance between the cutting troughs on the deck is compatible with the cutting tool. The holes on the deck have two functions. One is for water filtering and draining; another one is for air bubble nozzles. (Figure 3) The container has a water pipe inlet with an electrical-magnetic valve and inflow waters are sprinkle out from the shower nozzle; the lower storey of the container has bigger width than the secondary storey, and it connected with a water pipe outlet with an electrical control valve. The chemical surfactants / detergents for washing vegetable, fruits may be applied manually. It can be injected into inflow pipe and mixing with inflow water at beginning of washing process (Figure 2). It is an optional operation depends on the situation.

The main electrical parts are integrated into the cover lid of the container. Some of the mechatronics parts (such as air pump, motor, etc) are hold by the two chambers in the besides of the container (Figure 1 and figure 2) the chambers also can be designed either at the space between the double hull or inside the internal hull (Figure 1). The electrical parts function as process control and program setting. The program can be designed base on the flow chart and block diagram (Figure 5, 6).

Two long chambers at the up sides of the container to hold motor, air pump and related electronic components (Figure 2). The tubes, water pipes, valves are fixed into the space between double hulls. A special shower nozzle (see figure 2, 3, 4) connected with influent tube, controlled by electronic-magnetic valve. The velocity of the inflow through the shower nozzle should be around $2.1\text{m}^3/\text{m}^2\text{s}$. The shower nozzle also used in other steps in the washing process

The air pump in the one of the chamber connects with the tube to a serial air bubble nozzles. It pumps air into the water container from the bottom to deck holes through the air bubble nozzles. It acts as an air bubble cleaner. The power supply should be 110V/220-240 Voltage. Power rate should be around 15W based on the home using or bigger for large capacity. The velocity of the air should be around 5-10 L/min for home using. All the parameters should depend on the designed the size of the container and the capacity of the machine.

The ultrasonic generator /oscillator can use an electronics circuit of the NPN transistor and capacitor as similar as the industrial ultrasonic cleaner in the current market. But the shape of the electrode will be made into long bar which roundly moved by the motor or made into rectangle, or circular shape attached at the internal container and deck. The motor in the upside chamber of the container. The ultrasonic cleaner can remove very small particulars from the vegetable surface and also help removal of debris from the deck. It is an optional operation and should consider the environmental factors such as the frequency limitation by environmental authority. The power supply should be DC24 V. and power rate should be around 5-9 watt for home using or larger for big capacity.

The power supply box includes external power supply ~220V, internal power supply by the electronic circuits that converts ~220 V to DC 12/24 and 5V.

Further description and advantages of the invention can be apparent from the following claims and drawing description.

The description of the drawings

Figure 1: The overall view of the invent machine. Reference signs explain: 01- Air bubble tube 02-vegetable holding deck; 03- Influent soft pipe with a hose connector. 04 – Double hull container, between the hull layer occupied by wires and tubes. 05- Transparent door with a gasket waterproof edge. 06- Timer setting and manual press switch. 07-LCD/LED display. 08- Control panel cover lid, it can be opened or closed. 09- Chambers for holding air pump and motor holder. 10- Air bubble nozzle. 11- Deck base. 12- Draining soft pipe.

Figure 2: The internal parts of the invent machine/ cross-section view inside washing machine. The control system can be further developed into the microprocessor system. Reference signs explain: 13-Cutting trough on the deck 14-Air bubble tube. 15- Electrical valve. 16- Detergent injection. 17- Influent soft pipe with a hose connector 18-220VAC wire 19- Power supply box ~220VAC to 12VDC/24VDC. 20- Air pump. 21- Shower nozzle. 22- Push button. 23- Transmitter, relay and /or microprocessor. 24- Printed circuit board. 25- LED/LCD display 26- Motor and oscillator at the chamber. 27- Electrical wires 28- Cutting tool on the back of deck. 29- Water level sensors line to control line. 30 –Spring/joint base. 31-Overflow tube. 32-Switch valve control line. 33- Drain soft pipe/tube. 34- Air bubble nozzles.

Figure 3: The bird's eye cross-section view of internal container through the under long chambers. The deck has multi-function holes connected with air bubble nozzles, holes for water draining, cutting troughs for compatible with cutting tool. Reference signs explain: 35- Shower nozzle. 36- Water inlet valve. 37- Cutting trough on the deck formed by two raisers. 38- Cutting tool 39- Water draining holes on the deck. 40- Air bubble hole. 41- Drain valve. 42- Link tube for overflow control. 43- Long water draining hole.

Figure 4: The inlet shower nozzle model. The design principle is that water rinse needs generate certain pressure and reach certain distance based on design capacity. Reference signs explain: 44- Soft tube connected it to inflow pipe. 45- Screw/chuck tightened 46- Holes in the under linear. 47- Two plywood round layers. 48- The 3D style model. The thick of the two layers adjust the pressure of the water rinse. 49- The stainless steel screws and holes in lower layer can be increased depends on pressure design to reach effectively sprinkle wash.

Figure 5: The general micro-processor program simplified flow chart in which definition: SV- solenoid valve (electronics and hydraulic valves\normal closed). Herein SV1 refers to inflow valve. SV2 refers to draining valve; LS – Level scale from bottom of container. Herein LS 0 refers to no water, LS1 refers to 10 cm high water level, LS2 refers to 15cm high water level, LS 3 refers to 20 cm high water level. Above time setting are generally, precise time setting in the program need to adjust.

Figure 6: The block diagram of the electronic control system.

The extensive functions and possible development

The above design can be further developed by adding advanced microprocessor, precise timer control parts. New shapes of the cutting tools with semi-automatically controlled process.

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I Claims

1. The combined several methods to invent a machine for washing and dealing with vegetables and fruits for home and restaurant cooking preparation, and the machine has several functions that can be manual or programming operation. It includes a air bubble cleaner, a vibrating cleaner, a detergent injection with a tee pipe, a water rinse shower nozzle and a double hull container which has two layers separated by a deck with holes and cutting trough. The instruments and control panel are integrated into the cover lid, and two holding chambers are designed at the upsides of the either internal or external of the container hull to holding some mechatronics parts. In addition, the cutting process is general and manual operation depends on cutting trough deck. The washed object (vegetables, fruits etc) need a manual pre-treatment before put into wash machine.

The main part of the machine wherein said the water container can be made of the different safe, firm materials such as alloy, Perspex, plastic etc. And it can be made into different size and shapes.

The first paragraph mentioned manual and programmable cleaning process for vegetables and fruits includes pressured water washing, soaking, air bubbles cleaning, vibrating cleaning and draining. It is controlled by the press switches, sensor, timer and relay etc or microprocessor control system. The program can be made base on the following flow chart and block diagram

The said vibration cleaner in the first paragraph of this claim is either ultrasonic or a certain frequency (such as near ultrasonic 20kHz) vibrate generator which can remove very small soil/dust particles as well as some chemicals on the surface of the vegetables/fruits. And the shape of the electrode which is a vibration transmitter will made into long bar which round moved by the motor or made into rectangle, or circular shape attached on the internal container and deck.

The said liquid detergents injection tee pipe for washing vegetable, fruits in the first paragraph may be applied manually. It can be injected into inflow pipe and mixing with inflow water at beginning of washing process. It is an optional operation depends on the situation. And also, the said special shower nozzle will be applied in the rinse process. It will generate certain pressure and reach certain distance to wash away the dirty particulars. The shower nozzle also functions as inflow faucet in the other process.

At last, the cutting process mentioned in the first paragraph of this claim wherein said the cutting tool is set at the spring base/joint structure on the deck, at the back of the container in the wash machine. It can be manual operated after washing and draining process. The cutting tool is compatible with the cutting troughs on the deck. Both the cutting tool and troughs have to be made of safe, rusty resistant material to prevent it rusted in the water.

2. A method according to claim 1 wherein said air bubble cleaner is an air bubbles generator which connects with air bubble nozzles through tube. The air bubbles can generate hydrodynamic shear force so that brew away the soil and dirty liquid particles on the surface of the vegetables/ fruits.