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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 box-like 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. Herewith 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, 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. 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.

The extensive functions and possible development

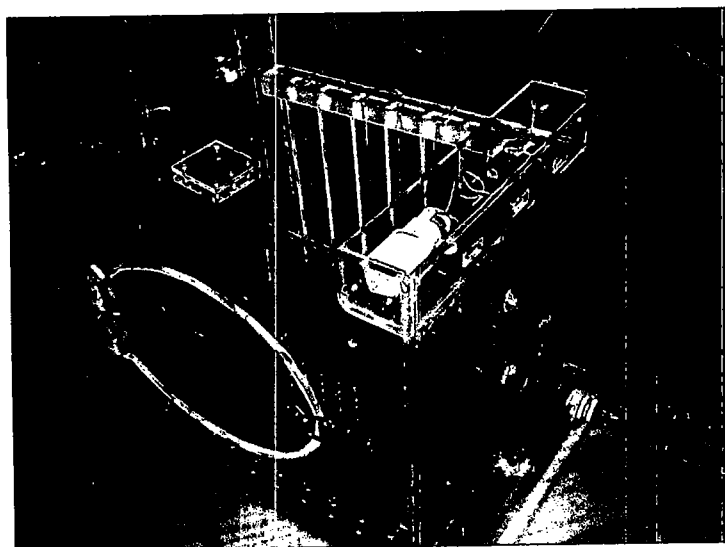
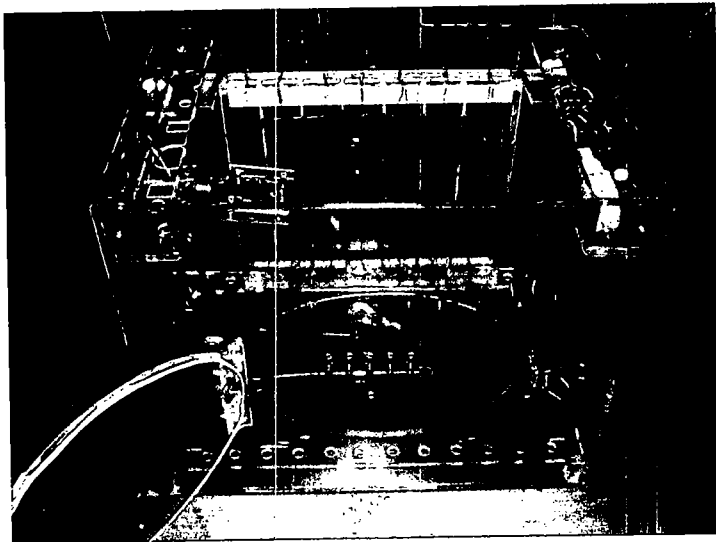
The above design can be further developed by adding advanced microprocessor, precise timer control parts. New shapes of the cutting tools with semi-automatically controlled process.

Miscellaneous document

Please see the next two pages with photos.

MISCELLANEOUS DOCUMENT:

EXPERIMENTAL PHOTOS:



These are experiment photos of the parts of the machine—the container internal hull, two long chambers, the special shower nozzle, one line of the air nozzles. The above description of the design has been modified based on the experiments data. The size, shape and material of the parts such as valves, cutting tools can be changeable based on the process situation and market condition. The cutting tool is not firm enough in the experiment so must compatible with cutting through (Not present photos please see the figure 3). The control instruments in the cover lid does

not present here because there are lots of similar hardware design currently in market. (Not program, the software can be written according to the above flow chart and block diagram).

REFERENCES

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"Changeable frequency" smart water level control electronic circuit. Radio 529. Qiáo JinXing (乔晋兴) published on 10, 2006. China.

Shower nozzle: <http://www.autocleanmfg.com/10a.htm> March 2007, Singapore

COURTESY TO:

Micro-drives, 14881 Evergreen Ave, Clearwater, FL33762 USA

Cyclo-system Pte Ltd website <http://www.cyclo-system.com>

Claims

1. The vegetables, fruits washing machine for home and restaurant cooking preparation combines several methods and 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. The said washed object (vegetables, fruits etc) need a pre-treatment such as generally remove the big putrid leaves/parts before put into wash machine. Herewith the said cutting process is general and manual operation.
 - (a) 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.
 - (b) A method according to claim 1 wherein said the 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
 - (c) A method according to claim 1 wherein said vibration cleaner is either ultrasonic or a certain frequency (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. The ultrasonic generator usually uses an electronic circuit of the NPN transistor with capacitor as similar as the currently industrial ultrasonic cleaner. But the shape of the electrode 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.

- (d) A method 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 in order to cut effectively. Both the cutting tool and troughs have to be made of safe, rusty resistant material to prevent it rusted in the water.
 - (e) The liquid 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. It is an optional operation depends on the situation.
 - (f) The 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.
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.