

FOOD CLEANING APPARATUS AND FOOD CLEANING METHOD USING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The instant disclosure relates to a cleaning apparatus and cleaning method; more particularly, to a food cleaning apparatus and a food cleaning method using the same.

2. Description of Related Art

Food cleaning is mostly done by human labour, but if food demand is large, the cleaning requires a lot of manpower and water, consuming considerable manpower and water resources.

The following description takes the edible bird's nest of cliff swallows (hereafter referred to as the bird's nest) for example. The bird's nest is built by the filamentous saliva of swiftlet, and the ingredients of the bird's nest are known to contain large amounts of glycoprotein with trace lipids. The bird's nest has been an ingredient of traditional Chinese medicine and the raw material is used in Chinese cuisine.

However, a lot of impurities remain on the uncleaned bird's nest, such as nitrate or nitrite. Some impurities are harmful to human, so these impurities should be removed. For example, nitrite in the bird's nest should not be detected at all by the food regulations in many countries.

Therefore, how to effectively remove the impurities from the edible food (e.g., the bird's nest) in a short period time to maintain the quality is the issue raises concerns over the food industry. Moreover, in order to reduce the production cost of the edible food, how to effectively clean the edible food (e.g., the bird's nest) is another problem.

To achieve the abovementioned improvement, the inventors strive via industrial experience and academic research to present the instant disclosure, which can provide additional improvement as mentioned above.

SUMMARY OF THE INVENTION

One embodiment of the instant disclosure provides a food cleaning apparatus for cleaning edible food by non-manual manner. Another embodiment of the instant disclosure provides a food cleaning method using the food cleaning apparatus for effectively removing the impurities, which are adhered on the edible food.

The food cleaning apparatus disposable on a working surface, comprises: a tank having a first compartment, a second compartment, and a liquid permeable basket, the first compartment arranged abreast to the second compartment, the first and the second compartments are in fluid communication above a predetermined height, the basket detachably arranged in the first compartment for receiving food; a circulation module having a pipe unit, a driving pump, and a microbubble generator, the pipe unit connecting the first compartment and the second compartment, wherein the first compartment is formed with a water inlet and a microbubble inlet both in communication

with the circulation module, the height of the water inlet and the height of the microbubble inlet are lower than the predetermined height, the driving pump and the microbubble generator are installed on the pipe unit, the microbubble generator is arranged between the microbubble inlet and the driving pump; and a filtering module having a filter, the filter having a mesh size, which is largest in the filtering module, the filter detachably installed on the pipe unit and arranged between the second compartment and the driving pump.

The food cleaning method using the food cleaning apparatus comprises: injecting a liquid into the tank until the liquid is flowing from the first compartment to the second compartment above the predetermined height; disposing uncleaned food in the basket; putting the basket in the first compartment, wherein the uncleaned food is restricted by the basket; and effecting the driving pump of the circulation module to drive the liquid to flow from the first compartment and to pass through the second compartment, the pipe unit, and back to the first compartment through the water inlet, the microbubble inlet, or the both, wherein when the liquid passes through the water inlet to reflow to the first compartment, the liquid generates a turbulence in the first compartment to effect the uncleaned edible food vibrating; and selectively effecting the circulation module, wherein when the liquid returns to the first compartment through the microbubble inlet, the microbubble generator generates a plurality of microbubbles moving to the basket for removing unwanted impurities on the food, wherein when the impurities flow from the basket to the filter via the first compartment and the second compartment, the filter prevents the impurities from entering the driving pump.

In summary, when the food cleaning method is implanted by using the food cleaning apparatus to clean the edible food, the impurities adhered on the edible food can be removed effectively by the circulation module.

In order to further appreciate the characteristics and technical contents of the instant disclosure, references are hereunder made to the detailed descriptions and appended drawings in connection with the instant disclosure. However, the appended drawings are merely shown for exemplary purposes, rather than being used to restrict the scope of the instant disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a food cleaning apparatus according to the instant disclosure;

Fig. 2 is a schematic diagram of the food cleaning apparatus according to the instant disclosure;

Fig. 3 is a flow chart a food cleaning method using the food cleaning apparatus according to the instant disclosure; and

Fig. 4 is a schematic diagram of the food cleaning apparatus during operation according to the instant disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to Figs. 1 and 2, which show an embodiment of the instant disclosure. The instant embodiment provides a food cleaning apparatus 100 and a food cleaning method using the food cleaning apparatus 100. The following description discloses the construction of each component and the

relationship between the components of the food cleaning apparatus 100 firstly. The food cleaning apparatus 100 includes a tank 1, a circulation module 2, a filtering module 3, a control module 4, and a cooling module 5.

The food cleaning apparatus 100 is disposed on a working surface W (e.g., ground), and the food cleaning apparatus 100 has a plurality of rollers 6 arranged on a bottom thereof, allowing easier shifting.

The instant embodiment discloses the food cleaning apparatus 100 applicable to clean, for example, the the bird's nest of cliff swallows or the tremella fuciformis. The food cleaning apparatus 100 in the instant embodiment is a cleaning apparatus for bird's nest of cliff swallows or tremella fuciformis, but the food cleaning apparatus 100 in the instant disclosure is not limited thereto. The following description discloses the construction of the food cleaning apparatus 100.

The tank 1 has a first compartment 11, a second compartment 12, and a liquid permeable basket 13. The first compartment 11 and the second compartment 12 of the instant embodiment are integrally formed with a platform 14 connecting there-between. However, the configuration of the instant embodiment is not intended to limit the instant disclosure.

Specifically, the first compartment 11 is arranged abreast to the second compartment 12, and the first and the second compartments 11, 12 are communicated with each other when above a predetermined height. The predetermined height in the instant embodiment is equal to the height of the platform 14 with respect to the working surface W. In other words, the first

and second compartments 11, 12 are in fluid communication above the platform 14.

The first compartment 11 and the second compartment 12 each has at least one drain opening 111, 121 formed on a bottom thereof, such that the food cleaning apparatus 100 can discharge the liquid received in the first compartment 11 and the second compartment 12 via the drain openings 111, 121. A portion of the second compartment 12 higher than the platform 14 (or the predetermined height) has an overflow opening 122, and an overflow pipe (drain) (not shown) is connected to the outer surface of the second compartment 12 for communicating with the overflow opening 122 (is put against the overflow opening 122 for receiving air or fluid).

Moreover, a portion of the first compartment 11 arranged away from the second compartment 12 has a water inlet 112 and a microbubble inlet 113. The height of the water inlet 112 and the height of the microbubble inlet 113 are lower than the predetermined height, and the microbubble inlet 113 is preferably arranged lower than the water inlet 112.

The basket 13 is detachably arranged in the first compartment 11 for receiving edible food (not shown). Specifically, the basket 13 and the inner surface of the first compartment 11 are spacedly arranged to avoid blocking the water inlet 112 and the microbubble inlet 113.

The circulation module 2 includes a pipe unit 21, a driving pump 24, a microbubble generator 25, an ozone generator 26, a water column solenoid valve 27, and a microbubble solenoid valve 28.

The pipe unit 21 has a common pipe 211, a first pipe 212, and a second pipe 213. One end of the common pipe 211 is connected to the drain opening 121 of the second compartment 12, and the other end of the common pipe 211 is connected to both the first pipe 212 and the second pipe 213. Another end of the first pipe 212 is connected to the water inlet 112 of the first compartment 11, and another end of the second pipe 213 is connected to the microbubble inlet 113 of the first compartment 11. In other words, the first pipe 212 communicates between the common pipe 211 and the water inlet 112 while the second pipe 213 communicates between the common pipe 211 and the microbubble inlet 113.

The driving pump 24 and the ozone generator 26 are installed on the common pipe 211, and the ozone generator 26 is arranged between the driving pump 24 and the drain opening 121 of the second compartment 12. The water column solenoid valve 27 is installed on the first pipe 212. The microbubble generator 25 and the microbubble solenoid valve 28 are installed on the second pipe 213, the microbubble generator 25 is arranged between the microbubble inlet 113 and the microbubble solenoid valve 28, and the microbubble solenoid valve 28 is arranged between the microbubble generator 25 and the driving pump 24.

The filtering module 3 has a filter 31, a first filtering net 32, and a second filtering net 33. The filter 31 is formed with the largest mesh size followed by the second filtering net 33 and the first filtering net 32 with the smallest mesh size. The filter 31 is detachably installed on the common pipe 211 and arranged

between the drain opening 121 of the second compartment 12 and the driving pump 24.

The first filtering net 32 and the second filtering net 33 are arranged between the first compartment 11 and the second compartment 12 and disposed on the platform 14, and the second filtering net 33 is arranged closer to the second compartment 12 compared to the first filtering net 32. The first filtering net 32 and the second filtering net 33 are arranged above the predetermined height, particularly, the first filtering net 32 and the second filtering net 33 are disposed on the platform 14. When above the predetermined height, the first compartment 11 communicates with the second compartment 12 via the first filtering net 32 and the second filtering net 33 in sequence. The basket 13 has a smaller mesh size than that of the first filtering net 32.

The control module 4 has an electrical control unit 41 and an input interface 42. The electrical control unit 41 is electrically connected to the input interface 42, the driving pump 24, the ozone generator 26, the water column solenoid valve 27, and the microbubble solenoid valve 28. The driving pump 24 is electrically connected to the electrical control unit 41 via a frequency converter 29, so that the driving pump 24 is capable of frequency conversion, but the instant disclosure is not limited thereto. Moreover, the user can control the control module 4 by the input interface 42, such that the operating time of the driving pump 24, frequency converter 29 and the ozone generator 26 can be assigned by the electrical control unit 41. Furthermore, the on/off of the water column solenoid valve 27 and the microbubble solenoid valve 28 is controlled by the electrical control unit 41.

Additionally, the electrical control unit 41 is electrically connected to a power supply unit (not shown) in order to supply electrical power to the food cleaning apparatus 100 (by the power supply unit).

The cooling module 5 has a cooler 51 and a cooling pipe 52. The cooling pipe 52 is connected to the cooler 51 and extended to the interior of the second compartment 12. Specifically, after filling water to the cooler 51 from an external water source, the cooler 51 can transfer cold water to the food cleaning apparatus 100 through the cooling pipe 52. Because the cooler 51 transfers cold water into the food cleaning apparatus 100, the height of water surface of the second compartment 12 increases. When the water surface of the second compartment 12 reaches the overflow opening 122, water flows out the second compartment 12 via the overflow opening 122 for maintaining the purity of water received in the food cleaning apparatus 100 and achieving better cooling effect of the food cleaning apparatus 100 after discharging water, which absorbing heat.

The configuration of the food cleaning apparatus 100 is described above. The following description discloses the food cleaning method using the food cleaning apparatus 100.

Please refer to Figs. 3 and 4. The food cleaning method using the food cleaning apparatus 100 includes the steps S100~S150. The number of each step is used for explaining in convenient, and the number of each step does not stand for the implementation order, that is to say, the user can adjust the implementation order of the steps according to the user's demand.

Step S100: injecting liquid 200 (i.e., water or cleaning agent) into the first compartment 11 of the tank 1 until the liquid 200 is flowing from the first compartment 11 to the second compartment 12 via the first filtering net 32 and the second filtering net 33 when above the predetermined height.

Step S110: disposing uncleaned edible food in the basket 13 and disposing the basket 13 in the first compartment 11, in which the uncleaned edible food is restricted by the basket 13. Specifically, the user can chose the basket 13 having a suitable mesh size according to the size of the uncleaned edible food to avoid the uncleaned edible food passing through the basket 13. Moreover, if some of the edible food passes through the basket 13, the food is collected in a space, which is jointly surrounded by the first filtering net 32, the second filtering net 33, and the platform 14.

Step S120: effecting the driving pump 24 of the circulation module 2 to drive the liquid 200 to flow from the first compartment 11 to the second compartment 12, the pipe unit 21, and back to the first compartment 11 through the water inlet 112, the microbubble inlet 113 or the both. When the liquid 200 passes through the water inlet 112 to the first compartment 11, the liquid 200 forms a water column in first compartment 11, causing turbulence in the basket 13 to effect the edible food vibrating.

Step S130: selectively effecting the microbubble generator 25 of the circulation module 2. When the liquid 200 passes through the microbubble inlet 113 back to the first compartment 11, the microbubble generator 25 generates a plurality of microbubbles moving to the basket 13 to remove unwanted particles or impurities on the edible food. Moreover, when the impurities flow

from the basket 13 to the filter 31 via the first compartment 11 and the second compartment 12, the filter 31 prevents the impurities from entering the driving pump 24.

Step S140: when cleaning the edible food after a predetermined time (or the edible food has been cleaned), stopping the circulation module 2, and then removing the basket 13 from the first compartment 11 in order to get the cleaned edible food in the basket 13. Moreover, the user can get some cleaned edible food, which passes through the basket 13 and is collected in the space jointly surrounded by the first filtering net 32, the second filtering net 33, and the platform 14.

Step S150: disposing uncleaned edible food in the basket 13, and cleaning the uncleaned edible food by repeating the above steps S100~S140. If the food cleaning apparatus 100 is not used, water received in the food cleaning apparatus 100 is discharged by the drain openings 111, 121 of the first compartment 11 and the second compartment 12.

Moreover, during the cleaning process, if the edible food is the bird's nest of cliff swallows, the ozone generator 26 of the circulation module 2 is not operated; if the edible food is the tremella fuciformis, the ozone generator 26 of the circulation module 2 is under operation to remove the bacteria and the pesticide on the tremella fuciformis. In other words, the ozone generator 26 can be used depends on the food being cleaned.

When the food cleaning apparatus 100 is under operation, the temperature of the liquid 200 is easily increased by the pipe unit 21. The instant embodiment

reduces the temperature of the liquid 200 by the cooling pipe 52 received in the second compartment 12.

[The possible effects of the instant embodiment]

In summary, when using the food cleaning apparatus to clean the edible food, the liquid can be repeatedly used to clean the edible food by the filtering module, and the impurities on the edible food can be removed effectively by the circulation module.

Moreover, the ozone generator can be used according to the kind of the edible food for increasing the cleaning effect of certain edible food (e.g., the tremella fuciformis).

The descriptions illustrated *supra* set forth simply the preferred embodiments of the instant disclosure; however, the characteristics of the instant disclosure are by no means restricted thereto. All changes, alternations, or modifications conveniently considered by those skilled in the art are deemed to be encompassed within the scope of the instant disclosure delineated by the following claims.

WHAT IS CLAIMED IS:

1. A food cleaning apparatus disposable on a working surface, comprising:

a tank (1) having a first compartment (11), a second compartment (12), and a liquid permeable basket (13), the first compartment (11) arranged abreast to the second compartment (12), the first and the second compartments (11, 12) are in fluid communication above a predetermined height, the basket (13) detachably arranged in the first compartment (11) for receiving food;

a circulation module (2) having a pipe unit (21), a driving pump (24), and a microbubble generator (25), the pipe unit (21) connecting the first compartment (11) and the second compartment (12),

wherein the first compartment (11) is formed with a water inlet (112) and a microbubble inlet (113) both in communication with the circulation module (2), the height of the water inlet (112) and the height of the microbubble inlet (113) are lower than the predetermined height, the driving pump (24) and the microbubble generator (25) are installed on the pipe unit (21), the microbubble generator (25) is arranged between the microbubble inlet (113) and the driving pump (24); and

a filtering module (3) having a filter (31), the filter (31) having a mesh size, which is largest in the filtering module (3), the filter (31) detachably installed on the pipe unit (21) and arranged between the second compartment (12) and the driving pump (24).

2. The food cleaning apparatus according to claim 1, wherein the pipe unit (21) has a common pipe (211), a first pipe (212), and a second pipe (213), one end of the common pipe (211) is connected to the second compartment (12), the other ends of the common pipe (211) is connected to the first pipe (212) and the second pipe (213) respectively, the other end of the first pipe (212) is connected to the water inlet (112) of the first compartment (11), the other end of the second pipe (213) is connected to the microbubble inlet (113) of the first compartment (11); the filter (31) and the driving pump (24) are installed on the common pipe (211), the filter (31) is arranged between the driving pump (24) and the second compartment (12), the microbubble generator (25) is installed on the second pipe (213).
3. The food cleaning apparatus according to claim 2, wherein the circulation module (2) has a water column solenoid valve (27) and a microbubble solenoid valve (28), the water column solenoid valve (27) is installed on the first pipe (212), the microbubble solenoid valve (28) is installed on the second pipe (213) and arranged between the microbubble generator (25) and the driving pump (24).
4. The food cleaning apparatus according to claim 1, 2, or 3, wherein the circulation module (2) has an ozone generator (26), the ozone generator (26) is installed on the pipe unit (21) and arranged between the driving pump (24) and the filter (31).

5. The food cleaning apparatus according to claim 4, further comprising a control module (4), wherein the control module (4) is electrically connected to the driving pump (24) and the ozone generator (26), and the control module (4) controls operating time of the driving pump (24) and the ozone generator (26).
6. The food cleaning apparatus according to claim 4, further comprising a cooler (51) and a cooling pipe (52), wherein the cooling pipe (52) is connected to the cooler (51) and extended into the second compartment (12).
7. The food cleaning apparatus according to claim 1, 2, or 3, wherein the filtering module (3) has a first filtering net (32), the first filtering net (32) is arranged between the first compartment (11) and the second compartment (12) and arranged above the predetermined height to cause the first compartment (11) in communication with the second compartment (12) via the first filtering net (32).
8. The food cleaning apparatus according to in claim 7, wherein the filtering module (3) has a second filtering net (33), the second filtering net (33) is arranged between the first compartment (11) and the second compartment (12) and arranged above the predetermined height, the second filtering net (33) is closer to the second compartment (12) with respect to the first filtering net (32), a mesh size of the second filtering net (33) is larger than a mesh size of the

first filtering net (32), when above the predetermined height, the first compartment (11) communicates to the second compartment (12) via the first filtering net (32) and the second filtering net (33) in sequence.

9. The food cleaning apparatus according to claim 7, wherein a mesh size of the basket (13) is smaller than the mesh size of the first filtering net (32).

10. A food cleaning method using the food cleaning apparatus according to claim 1, the food cleaning method comprising:

injecting a liquid (200) into the tank (1) until the liquid (200) is flowing from the first compartment (11) to the second compartment (12) above the predetermined height;

disposing uncleaned food in the basket (13);

putting the basket (13) in the first compartment (11), wherein the uncleaned food is restricted by the basket (13); and

effecting the driving pump (24) of the circulation module (2) to drive the liquid (200) to flow from the first compartment (11) and to pass through the second compartment (12), the pipe unit (21), and back to the first compartment (11) through the water inlet (112), the microbubble inlet (113), or the both,

wherein when the liquid (200) passes through the water inlet (112) to reflow to the first compartment (11), the liquid (200)

generates a turbulence in the first compartment (11) to effect the uncleaned food vibrating; and

selectively effecting the circulation module (2), wherein when the liquid (200) returns to the first compartment (11) through the microbubble inlet (113), the microbubble generator (25) generates a plurality of microbubbles moving to the basket (13) for removing unwanted impurities on the food,

wherein when the impurities flow from the basket (13) to the filter (31) via the first compartment (11) and the second compartment (12), the filter (31) prevents the impurities from entering the driving pump (24).