# TREATMENT DEVICE AND METHOD FOR KITCHEN WASTE WITH PYROLYSIS CARBONIZATION

## CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Chinese Patent Application No. 202410622528.6, filed on May 20, 2024, which is herein incorporated by reference in its entirety.

## TECHNICAL FIELD

[0002] The present invention relates to the field of kitchen waste disposal technologies, and more particularly to a treatment device and a method for kitchen waste with pyrolysis carbonization.

## BACKGROUND

[0003] Kitchen waste refers to perishable biomass household waste such as food waste, leftovers, melon peels and fruit cores, and Chinese medicine residues. This kind of waste is generated in residents' daily lives and in activities such as food processing, catering services, and unit catering, which has a huge amount. If this waste cannot be scientifically treated, it is easy to breed bacteria and pollute the environment. Since the kitchen waste is mainly biomass waste, the kitchen waste is usually treated by pyrolysis. In a pyrolysis furnace, sealed pyrolysis is performed on the kitchen waste by gas or electric heating, and organic matter is cracked to produce low molecular compounds, which are mainly gaseous hydrogen, methane and carbon monoxide, and solid biochar, and these compounds can be recycled. The above common types of kitchen waste pyrolysis treatment devices still have the following shortcomings in actual applications.

[0004] During pyrolysis process, heating is mainly carried out by liquefied gas or electricity, and the combustible gas produced by cracking cannot be effectively utilized. The overall pyrolysis process has high energy consumption, is uneconomical, and has high operation and maintenance costs. At the same time, the exhaust gas produced during the pyrolysis process also contains waste heat and impurities, which are directly discharged to pollute the environment and are not energy-saving or environmentally friendly.

## SUMMARY

[0005] The present invention provides a treatment device for kitchen waste with a pyrolysis carbonization method and a treatment method thereof to solve the above problems proposed in background.

[0006] In order to solve the above technical problems, the technical solutions of the present invention are as follows.

[0007] An embodiment of the present invention provides a treatment device for kitchen waste with pyrolysis carbonization, including: a base, a pyrolysis furnace body, a feeding mechanism, a front spiral feeding mechanism, a dust removal mechanism, a waste heat recovery mechanism, a charcoal residue collecting mechanism, a back spiral feeding mechanism, and a distribution cabinet. The pyrolysis furnace body is fixedly installed on a front of the base, and is configured to perform the pyrolysis carbonization on the kitchen waste. The feeding mechanism is fixedly installed on a side of a back of the base, and is configured to lift and crush the kitchen waste to obtain crushed kitchen waste. The front spiral feeding mechanism is fixedly installed between the feeding mechanism and the pyrolysis furnace body, and is configured to transport the crushed kitchen waste. The dust removal mechanism is fixedly installed on a middle of the base, and is configured to purify fine particulate matters in pyrolyzed exhaust gas to obtain purified waste gas. The waste heat recovery mechanism is fixedly installed on another side of the back of the base, and is configured to recover waste heat in the purified waste gas. The charcoal residue collecting mechanism is fixedly installed on an end of the base, and is configured to centralize pyrolyzed kitchen waste charcoal residues. The back spiral feeding mechanism is fixedly installed between the charcoal residue collecting mechanism and the pyrolysis furnace body, and is configured to transport the pyrolyzed kitchen waste charcoal residues. The distribution cabinet is fixedly installed on an edge of the base.

[0008] In an embodiment, a controller is fixedly installed on an inside of the distribution cabinet, an operation panel is fixedly installed on a surface of the distribution cabinet, and a power switch and a touch screen display are fixedly installed on a surface of the operation panel.

[0009] Through the above technical solution, the treatment device is designed in an integrated manner, which is conductive for operation and management.

[0010] In an embodiment, the pyrolysis furnace body includes a pyrolysis outer furnace, a rotary inner furnace, an insulation bracket, a liquefied gas cylinder group, a main gas supply pipe, multiple branch pipes, an arc-shaped gas pipe, a burning nozzle, a slag concentration cover, a pyrolysis gas conduit and multiple pyrolysis gas branch pipes. The rotary inner furnace is rotatably disposed on an inside of the pyrolysis outer furnace. The insulation bracket is fixedly disposed on a front of the pyrolysis outer furnace, and the liquefied gas cylinder group is installed on the

insulation bracket. The main gas supply pipe is installed on the liquefied gas cylinder group, and a side of the main gas supply pipe is fixedly connected to the multiple branch pipes extending to the inside of the pyrolysis outer furnace. An end of each of the multiple branch pipes is fixedly connected to the arc-shaped gas pipe, two ends of the arc-shaped gas pipe each are fixedly installed with the burning nozzle, and the burning nozzle is disposed directly facing towards the rotary inner furnace. The slag concentration cover is installed on an end of the rotary inner furnace, and a top of the slag concentration cover is fixedly connected to the pyrolysis gas conduit extending to an inside of the pyrolysis outer furnace. The pyrolysis gas conduit is fixedly connected to the multiple pyrolysis gas branch pipes, and an end of each of the multiple pyrolysis gas branch pipes is fixedly installed on the burning nozzle. The rotary inner furnace is electrically connected to the controller.

[0011] Through the above technical solution, the combustible gas produced by pyrolysis will be introduced into the burning nozzles through the pyrolysis gas conduit to burn together with the liquefied gas, to thereby provide heat for pyrolysis, which is beneficial to reduce the consumption of the liquefied gas.

[0012] In an embodiment, the feeding mechanism includes a crushing bin, a feeding funnel, a shredding machine, a drain tank, and a straight tube drainage hoister. The feeding funnel is fixedly connected to a side of a top of the crushing bin. The shredding machine is fixedly installed on a middle of the top of the crushing bin, and the drain tank is fixedly disposed on a back of the crushing bin. The straight tube drainage hoister is fixedly installed on a top of the drain tank, and a waste discharge outlet of the straight tube drainage hoister is disposed directly facing towards the feeding funnel. The straight tube drainage hoister and the shredding machine are electrically connected to the controller.

[0013] Through the above technical solution, the kitchen waste can be automatically fed and crushed to improve the pyrolysis efficiency.

[0014] In an embodiment, each of the front spiral feeding mechanism and the back spiral feeding mechanism includes a feeding cylinder, a geared motor, a pushing auger, a feeding port and a discharging port. The geared motor is fixedly installed on a bottom of the feeding cylinder. The pushing auger is fixedly installed on an output end of the geared motor. A bottom of the feeding cylinder is fixedly connected to the feeding port, and a top of the feeding cylinder is fixedly connected to the discharging port. The geared motor is electrically connected to the controller.

[0015] Through the above technical solution, the kitchen waste can be automatically fed, the pyrolysis efficiency is high, and the management is convenient.

[0016] In an embodiment, the dust removal mechanism includes a support frame, a cyclone dust collector, an exhaust pipe and a draft tube. The cyclone dust collector is fixedly installed on the support frame, and an air inlet of the cyclone dust collector is fixedly connected to the exhaust pipe. An end of the exhaust pipe is fixedly connected to a top of the pyrolysis outer furnace, and an air outlet of the cyclone dust collector is fixedly connected to the draft tube. The cyclone dust collector is electrically connected to the controller.

[0017] Through the above technical solution, the exhaust gas produced by pyrolysis can be purified, and the exhaust gas emissions are more environmentally friendly.

[0018] In an embodiment, the waste heat recovery mechanism includes a catch basin, a cooling cylinder, a spiral heat exchange pipe, a centrifugal fan, an outward exhaust pipe, a return pipe, a check valve, a thermal insulation water tank, a lifting pump, a lifting pipe, a spray pipe, a heating water pipe and a manual valve. The cooling cylinder is fixedly connected to the catch basin, and the spiral heat exchange pipe is fixedly disposed on an inside of the cooling cylinder. A top of the spiral heat exchange pipe is fixedly connected to the draft tube, and the centrifugal fan is fixedly installed on a bottom of the spiral heat exchange pipe. An air outlet of the centrifugal fan is fixedly connected to an outward exhaust pipe. A bottom of the catch basin is fixedly connected to the return pipe, and the check valve is fixedly installed on a middle of the return pipe. The thermal insulation water tank is fixedly installed on an end of the return pipe, and the lifting pump is fixedly installed on a top of the thermal insulation water tank. A water outlet of the lifting pump is fixedly connected to the lifting pipe, and the spray pipe is fixedly installed on a top of the lifting pipe. The spray pipe is fixedly installed on a top of an inner wall of the cooling cylinder. The centrifugal fan and the lifting pump are electrically connected to the controller. A bottom of the thermal insulation water tank is fixedly connected to the heating water pipe, and the manual valve is fixedly installed on the heating water pipe.

[0019] Through the above technical solution, the waste heat in the exhaust gas can be reused, which is more energy-saving and environmentally friendly.

[0020] In an embodiment, the charcoal residue collecting mechanism includes a carbonization storage box and a slag discharge door hinged on the carbonization storage box.

[0021] Through the above technical solution, the carbon residue is easy to clean.

[0022] A treatment method for kitchen waste with pyrolysis carbonization includes:

step 1, draining water from the kitchen waste and crushing the kitchen waste, including: pouring the kitchen waste to be treated into the feeding mechanism, and draining water from the kitchen waste and crushing the kitchen waste by the feeding mechanism to obtain the crushed kitchen waste;

step 2, feeding and pyrolyzing the crushed kitchen waste, including: driving the crushed kitchen waste into the pyrolysis furnace body by the front spiral feeding mechanism, and pyrolyzing the crushed kitchen waste in the pyrolysis furnace body to obtain the pyrolyzed kitchen waste charcoal residues;

step 3, cleaning the pyrolyzed kitchen waste charcoal residues, including: transporting the pyrolyzed kitchen waste charcoal residues into the charcoal residue collecting mechanism automatically by the back spiral feeding mechanism, and collecting the pyrolyzed kitchen waste charcoal residues; and

step 4, recovering the pyrolyzed kitchen waste charcoal residues, including: opening the charcoal residue collecting mechanism to collect and reuse the pyrolyzed kitchen waste charcoal residues centralized in the charcoal residue collecting mechanism.

[0023] In an embodiment, in the step 2, exhaust gas produced during the pyrolyzing enters the dust removal mechanism for filtration and purification to obtain purified exhaust gas, and the purified exhaust gas is introduced into the waste heat recovery mechanism to recover heat in the purified exhaust gas.

[0024] The above solutions of the present invention at least include the following beneficial effects.

[0025] 1. The present invention adopts a new pyrolysis furnace body structure, the rotary furnace is used for pyrolysis, thus the kitchen waste is heated evenly, and the pyrolysis efficiency is high. The combustible gas produced by pyrolysis will be introduced into the burning nozzles through the pyrolysis gas conduit to burn together with the liquefied gas, to thereby provide heat for pyrolysis, which is beneficial to reduce the consumption of the liquefied gas. The pyrolysis gas can be utilized fully and effectively, and the entire pyrolysis process is more energy-efficient. The integrated pyrolysis carbonization treatment method is convenient for operation and management, and the operation and maintenance cost is lower.

[0026] 2. During the pyrolysis process of the present invention, the produced high-temperature exhaust gas passes through the dust removal mechanism to filter out impurities, and then passes

through the waste heat recovery mechanism to recover waste heat, thereby reducing particulate matters and heat in the exhaust gas, making the exhaust gas emissions more environmentally friendly, and the heat in the exhaust gas can also be recovered.

## BRIEF DESCRIPTION OF DRAWINGS

[0027] FIG. 1 illustrates a schematic structural diagram of a treatment device for kitchen waste with pyrolysis carbonization according to an embodiment of the present invention.

[0028] FIG. 2 illustrates a schematic structural diagram of a waste heat recovery mechanism of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0029] FIG. 3 illustrates a schematic sectional diagram from a front perspective of the waste heat recovery mechanism of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0030] FIG. 4 illustrates a schematic sectional diagram from a top perspective of a pyrolysis furnace body of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0031] FIG. 5 illustrates a schematic structural diagram of a feeding mechanism of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0032] FIG. 6 illustrates a schematic structural diagram of a spiral feeding mechanism of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0033] FIG. 7 illustrates a schematic sectional diagram from a front perspective of a spray-burning mechanism of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0034] FIG. 8 illustrates a schematic sectional diagram from a front perspective of a distribution cabinet of the treatment device for kitchen waste with the pyrolysis carbonization according to an embodiment of the present invention.

[0035] Description of reference signs:

1-base; 2-pyrolysis outer furnace; 3-rotary inner furnace; 4-front spiral feeding mechanism; 401-feeding cylinder; 402-pushing auger; 403-geared motor; 404-feeding port; 405-discharging port; 5-crushing bin; 6-shredding machine; 7-feeding funnel; 8-straight tube drainage hoister; 9-

exhaust pipe; 10-distribution cabinet; 11-support frame; 12-cyclone dust collector; 13-draft tube; 14-cooling cylinder; 15-thermal insulation water tank; 16-lifting pump; 17-lifting pipe; 18-carbonization storage box; 19-slag discharge door; 20-back spiral feeding mechanism; 21-insulation bracket; 22-liquefied gas cylinder group; 23-main gas supply pipe; 24-pyrolysis gas conduit; 25-slag concentration cover; 26-catch basin; 27-centrifugal fan; 28-outward exhaust pipe; 29-heating water pipe; 30-manual valve; 31-return pipe; 32-check valve; 33-spiral heat exchange pipe; 34-spray pipe; 35-burning nozzle; 36-arc-shaped gas pipe; 37-pyrolysis gas branch pipe; 38-drain tank; 39-controller; 40-operation panel; 41-branch pipe.

## DETAILED DESCRIPTION OF EMBODIMENTS

[0036] The exemplary embodiments of the present invention will be described in more detail below with reference to the accompanying drawings. Although the exemplary embodiments of the present invention are shown in the accompanying drawings, it should be understood that the present invention can be implemented in various forms and should not be limited by the embodiments set forth herein. On the contrary, these embodiments are provided to enable a more thorough understanding of the present invention and to enable a scope of the present invention to be fully communicated to those skilled in the art.

[0037] As shown in FIGS. 1-8, an embodiment of the present invention provides a treatment device for kitchen waste with pyrolysis carbonization, including: a base 1, a pyrolysis furnace body, a feeding mechanism, a front spiral feeding mechanism 4, a dust removal mechanism, a waste heat recovery mechanism, a charcoal residue collecting mechanism, a back spiral feeding mechanism 20, and a distribution cabinet 10. The pyrolysis furnace body is fixedly installed on a front of the base 1, and is configured to perform the pyrolysis carbonization on the kitchen waste. The feeding mechanism is fixedly installed on a side of a back of the base 1, and is configured to lift and crush the kitchen waste to obtain crushed kitchen waste. The front spiral feeding mechanism 4 is fixedly installed between the feeding mechanism and the pyrolysis furnace body, and is configured to transport the crushed kitchen waste. The dust removal mechanism is fixedly installed on a middle of the base 1, and is configured to purify fine particulate matters in pyrolyzed exhaust gas to obtain purified waste gas. The waste heat recovery mechanism is fixedly installed on another side of the back of the base 1, and is configured to recover waste heat in the purified waste gas. The charcoal residue collecting mechanism is fixedly installed on an end of the base 1, and is configured to centralize pyrolyzed kitchen waste charcoal residues. The back spiral feeding mechanism 20 is

fixedly installed between the charcoal residue collecting mechanism and the pyrolysis furnace body, and is configured to transport the pyrolyzed kitchen waste charcoal residues. The distribution cabinet 10 is fixedly installed on an edge of the base 1.

[0038] The charcoal residue collecting mechanism includes a carbonization storage box 18 and a slag discharge door 19 hinged on the carbonization storage box 18.

[0039] A controller 39 is fixedly installed on an inside of the distribution cabinet 10, an operation panel 40 is fixedly installed on a surface of the distribution cabinet 10, and a power switch and a touch screen display are fixedly installed on a surface of the operation panel 40.

[0040] In the embodiment of the present invention, water in the kitchen waste is drained and the kitchen waste is crushed by the feeding mechanism. The crushed kitchen waste is driven by the front spiral feeding mechanism 4 to enter the pyrolysis furnace body, and is pyrolyzed in the pyrolysis furnace body. The pyrolyzed kitchen waste charcoal residues are transported by the back spiral feeding mechanism 20 to automatically enter the charcoal residue collecting mechanism to be collected.

[0041] Referring to FIG. 1, FIG. 4 and FIG. 7, in an embodiment, the pyrolysis furnace body includes a pyrolysis outer furnace 2, a rotary inner furnace 3, an insulation bracket 21, a liquefied gas cylinder group 22, a main gas supply pipe 23, multiple branch pipes 41, an arc-shaped gas pipe 36, a burning nozzle 35, a slag concentration cover 25, a pyrolysis gas conduit 24 and multiple pyrolysis gas branch pipes 37. The rotary inner furnace 3 is rotatably disposed on an inside of the pyrolysis outer furnace 2. The insulation bracket 21 is fixedly disposed on a front of the pyrolysis outer furnace 2, and the liquefied gas cylinder group 22 is installed on the insulation bracket 21. The main gas supply pipe 23 is installed on the liquefied gas cylinder group 22, and a side of the main gas supply pipe 23 is fixedly connected to the multiple branch pipes 41 extending to the inside of the pyrolysis outer furnace 2. An end of each of the multiple branch pipes 41 is fixedly connected to the arc-shaped gas pipe 36, two ends of the arc-shaped gas pipe 36 each are fixedly installed with the burning nozzle 35, and the burning nozzle 35 is disposed directly facing towards the rotary inner furnace 3. The slag concentration cover 25 is installed on an end of the rotary inner furnace 3, and a top of the slag concentration cover 25 is fixedly connected to the pyrolysis gas conduit 24 extending to an inside of the pyrolysis outer furnace 2. The pyrolysis gas conduit 24 is fixedly connected to the multiple pyrolysis gas branch pipes 37, and an end of each of the multiple

pyrolysis gas branch pipes 37 is fixedly installed on the burning nozzle 35. The rotary inner furnace 3 is electrically connected to the controller 39.

[0042] In the embodiment of the present invention, the crushed kitchen waste will enter the rotary inner furnace 3, the rotary inner furnace 3 will rotate to turn over the kitchen waste inside. The liquefied gas in the liquefied gas cylinder group 22 will enter the branch pipes 41 through the main gas supply pipe 23, then enter the burning nozzle 35 through the arc-shaped gas pipe 36, to heat the rotary inner furnace 3. The pyrolysis gas produced by the kitchen waste will enter the pyrolysis gas branch pipes 37 through the pyrolysis gas conduit 24, and then enter the burning nozzle 35. The pyrolysis gas can be fully utilized, reducing the use of the liquefied gas and saving more energy.

[0043] Referring to FIG. 1 and FIG. 5, in an embodiment, the feeding mechanism includes a crushing bin 5, a feeding funnel 7, a shredding machine 6, a drain tank 38, and a straight tube drainage hoister 8. The feeding funnel 7 is fixedly connected to a side of a top of the crushing bin 5. The shredding machine 6 is fixedly installed on a middle of the top of the crushing bin 5, and the drain tank 38 is fixedly disposed on a back of the crushing bin 5. The straight tube drainage hoister 8 is fixedly installed on a top of the drain tank 38, and a waste discharge outlet of the straight tube drainage hoister 8 is disposed directly facing towards the feeding funnel 7. The straight tube drainage hoister 8 and the shredding machine 6 are electrically connected to the controller 39.

[0044] In the embodiment of the present invention, the kitchen waste is poured into a funnel of the straight tube drainage hoister 8, and excess water will drip into the drain tank 38 under the action of gravity and be collected uniformly. The kitchen waste is driven by the straight tube drainage hoister 8 to enter the crushing bin 5 through the feeding funnel 7. The entered kitchen waste is crushed by the shredding machine 6, and the crushed kitchen waste falls into the front spiral feeding mechanism 4.

[0045] Referring to FIG. 1, FIG. 5 and FIG. 6, in an embodiment, each of the front spiral feeding mechanism 4 and the back spiral feeding mechanism 20 includes a feeding cylinder 401, a geared motor 403, a pushing auger 402, a feeding port 404 and a discharging port 405. The geared motor 403 is fixedly installed on a bottom of the feeding cylinder 401. The pushing auger 402 is fixedly installed on an output end of the geared motor 403. A bottom of the feeding cylinder 401 is fixedly

connected to the feeding port 404, and a top of the feeding cylinder 401 is fixedly connected to the discharging port 405. The geared motor 403 is electrically connected to the controller 39.

[0046] In the embodiment of the present invention, the crushed kitchen waste enters the feeding cylinder 401 through the feeding port 404. The geared motor 403 drives the pushing auger 402 to rotate in the feeding cylinder 401, so that the kitchen waste is pushed to be discharged through the discharging port 405 to enter the rotary inner furnace 3, and the kitchen waste is pyrolyzed in the rotary inner furnace 3.

[0047] Referring to FIG. 1, the dust removal mechanism includes a support frame 11, a cyclone dust collector 12, an exhaust pipe 9 and a draft tube 13. The cyclone dust collector 12 is fixedly installed on the support frame 11, and an air inlet of the cyclone dust collector 12 is fixedly connected to the exhaust pipe 9. An end of the exhaust pipe 9 is fixedly connected to a top of the pyrolysis outer furnace 2, and an air outlet of the cyclone dust collector 12 is fixedly connected to the draft tube 13. The cyclone dust collector 12 is electrically connected to the controller 39.

[0048] In the embodiment of the present invention, the exhaust gas produced during the pyrolysis process enters the cyclone dust collector 12 through the exhaust pipe 9, and the particulate matter in the exhaust gas will be filtered by the cyclone dust collector 12. The purified exhaust gas will enter the waste heat recovery mechanism through the draft tube 13.

[0049] Referring to FIGS. 1-3, in an embodiment, the waste heat recovery mechanism includes a catch basin 26, a cooling cylinder 14, a spiral heat exchange pipe 33, a centrifugal fan 27, an outward exhaust pipe 28, a return pipe 31, a check valve 32, a thermal insulation water tank 15, a lifting pump 16, a lifting pipe 17, a spray pipe 34, a heating water pipe 29 and a manual valve 30. The cooling cylinder 14 is fixedly connected to the catch basin 26, and the spiral heat exchange pipe 33 is fixedly disposed on an inside of the cooling cylinder 14. A top of the spiral heat exchange pipe 33 is fixedly connected to the draft tube 13, and the centrifugal fan 27 is fixedly installed on a bottom of the spiral heat exchange pipe 33. An air outlet of the centrifugal fan 27 is fixedly connected to an outward exhaust pipe 28. A bottom of the catch basin 26 is fixedly connected to the return pipe 31, and the check valve 32 is fixedly installed on a middle of the return pipe 31. The thermal insulation water tank 15 is fixedly installed on an end of the return pipe 31, and the lifting pump 16 is fixedly installed on a top of the thermal insulation water tank 15. A water outlet of the lifting pump 16 is fixedly connected to the lifting pipe 17, and the spray pipe 34 is fixedly installed on a top of the lifting pipe 17. The spray pipe 34 is fixedly installed on a top of an inner

wall of the cooling cylinder 14. The centrifugal fan 27 and the lifting pump 16 are electrically connected to the controller 39. A bottom of the thermal insulation water tank 15 is fixedly connected to the heating water pipe 29, and the manual valve 30 is fixedly installed on the heating water pipe 29.

[0050] In the embodiment of the present invention, the purified exhaust gas enters the spiral heat exchange pipe 33 through the draft tube 13, and enters the outward exhaust pipe 28 through the centrifugal fan 27 to be discharged. During this process, the lifting pump 16 will fill the water in the thermal insulation water tank 15 into the spray pipe 34 through the lifting pipe 17. The water is sprayed from top to bottom, and is in contact with the spiral heat exchange pipe 33 for heat exchange, and finally the water falls into the catch basin 26 and enters the thermal insulation water tank 15 through the return pipe 31. The heated water can provide hot water for the staff to wash, and the waste heat can be effectively utilized.

[0051] A treatment method for kitchen waste with pyrolysis carbonization includes the following steps 1-4.

[0052] In step 1, the water is drained from the kitchen waste, and the kitchen waste is crushed. Specifically, the kitchen waste to be treated is poured into the feeding mechanism, and water is drained from the kitchen waste and the kitchen waste is crushed by the feeding mechanism to obtain the crushed kitchen waste.

[0053] In step 2, the crushed kitchen waste is fed and pyrolyzed. Specifically, the crushed kitchen waste is driven into the pyrolysis furnace body by the front spiral feeding mechanism 4, and the crushed kitchen waste is pyrolyzed in the pyrolysis furnace body to obtain pyrolyzed kitchen waste charcoal residues. Exhaust gas produced during the pyrolyzing enters the dust removal mechanism for filtration and purification to obtain purified exhaust gas. The purified exhaust gas is introduced into the waste heat recovery mechanism to recover heat in the purified exhaust gas.

[0054] In step 3, the pyrolyzed kitchen waste charcoal residues are cleaned. Specifically, the pyrolyzed kitchen waste charcoal residues are transported into the charcoal residue collecting mechanism automatically by the back spiral feeding mechanism 20, and the pyrolyzed kitchen waste charcoal residues are collected.

[0055] In step 4, the pyrolyzed kitchen waste charcoal residues are recovered. Specifically, the charcoal residue collecting mechanism is opened to collect and reuse the pyrolyzed kitchen waste charcoal residues centralized in the charcoal residue collecting mechanism.

[0056] In the embodiment of the present invention, the combustible gas produced by pyrolysis will be introduced into the burning nozzles 35 through the pyrolysis gas conduit 24 to burn together with the liquefied gas, to thereby provide heat for pyrolysis, which is beneficial to reduce the consumption of the liquefied gas, and the pyrolysis gas can be utilized fully and effectively.

[0057] The above are some embodiments of the present invention. It should be pointed out that, for those skilled in the art, multiple improvements and modifications can be made without departing from principles of the present invention. These improvements and modifications should also be regarded as the scope of protection of the present invention.

WHAT IS CLAIMED IS:

1. A treatment device for kitchen waste with pyrolysis carbonization, comprising:

a base (1);

a pyrolysis furnace body, fixedly installed on a front of the base (1), and configured to perform the pyrolysis carbonization on the kitchen waste;

a feeding mechanism, fixedly installed on a side of a back of the base (1), and configured to lift and crush the kitchen waste to obtain crushed kitchen waste;

a front spiral feeding mechanism (4), fixedly installed between the feeding mechanism and the pyrolysis furnace body, and configured to transport the crushed kitchen waste;

a dust removal mechanism, fixedly installed on a middle of the base (1), and configured to purify particulate matters in pyrolyzed exhaust gas to obtain purified waste gas;

a waste heat recovery mechanism, fixedly installed on another side of the back of the base (1), and configured to recover waste heat in the purified waste gas;

a charcoal residue collecting mechanism, fixedly installed on an end of the base (1), and configured to centralize pyrolyzed kitchen waste charcoal residues;

a back spiral feeding mechanism (20), fixedly installed between the charcoal residue collecting mechanism and the pyrolysis furnace body, and configured to transport the pyrolyzed kitchen waste charcoal residues; and

a distribution cabinet (10), fixedly installed on an edge of the base (1).

2. The treatment device of claim 1, wherein a controller (39) is fixedly installed on an inside of the distribution cabinet (10), an operation panel (40) is fixedly installed on a surface of the distribution cabinet (10), and a power switch and a touch screen display are fixedly installed on a surface of the operation panel (40).

3. The treatment device of claim 2, wherein the pyrolysis furnace body comprises a pyrolysis outer furnace (2) and a rotary inner furnace (3) rotatably disposed on an inside of the pyrolysis outer furnace (2), an insulation bracket (21) is fixedly disposed on a front of the pyrolysis outer furnace (2), a liquefied gas cylinder group (22) is installed on the insulation bracket (21), a main gas supply pipe (23) is installed on the liquefied gas cylinder group (22), a side of the main gas supply pipe (23) is fixedly connected to multiple branch pipes (41) extending to the inside of the pyrolysis outer furnace (2), an end of each of the multiple branch pipes (41) is fixedly connected to an arc-shaped gas pipe (36), two ends of the arc-shaped gas pipe (36) each are fixedly installed

with a burning nozzle (35), the burning nozzle (35) is disposed directly facing towards the rotary inner furnace (3), a slag concentration cover (25) is installed on an end of the rotary inner furnace (3), a top of the slag concentration cover (25) is fixedly connected to a pyrolysis gas conduit (24) extending to an inside of the pyrolysis outer furnace (2), the pyrolysis gas conduit (24) is fixedly connected to multiple pyrolysis gas branch pipes (37), an end of each of the multiple pyrolysis gas branch pipes (37) is fixedly installed on the burning nozzle (35), and the rotary inner furnace (3) is electrically connected to the controller (39).

4. The treatment device of claim 2, wherein the feeding mechanism comprises a crushing bin (5) and a feeding funnel (7) fixedly connected to a side of a top of the crushing bin (5), a shredding machine (6) is fixedly installed on a middle of the top of the crushing bin (5), a drain tank (38) is fixedly disposed on a back of the crushing bin (5), a straight tube drainage hoister (8) is fixedly installed on a top of the drain tank (38), a waste discharge outlet of the straight tube drainage hoister (8) is disposed directly facing towards the feeding funnel (7), and the straight tube drainage hoister (8) and the shredding machine (6) are electrically connected to the controller (39).

5. The treatment device of claim 2, wherein each of the front spiral feeding mechanism (4) and the back spiral feeding mechanism (20) comprises a feeding cylinder (401) and a geared motor (403) fixedly installed on a bottom of the feeding cylinder (401), a pushing auger (402) is fixedly installed on an output end of the geared motor (403), a bottom of the feeding cylinder (401) is fixedly connected to a feeding port (404), a top of the feeding cylinder (401) is fixedly connected to a discharging port (405), and the geared motor (403) is electrically connected to the controller (39).

6. The treatment device of claim 3, wherein the dust removal mechanism comprises a support frame (11) and a cyclone dust collector (12) fixedly installed on the support frame (11), an air inlet of the cyclone dust collector (12) is fixedly connected to an exhaust pipe (9), an end of the exhaust pipe (9) is fixedly connected to a top of the pyrolysis outer furnace (2), an air outlet of the cyclone dust collector (12) is fixedly connected to a draft tube (13), and the cyclone dust collector (12) is electrically connected to the controller (39).

7. The treatment device of claim 6, wherein the waste heat recovery mechanism comprises a catch basin (26) and a cooling cylinder (14) fixedly connected to the catch basin (26), a spiral heat exchange pipe (33) is fixedly disposed on an inside of the cooling cylinder (14), a top of the spiral heat exchange pipe (33) is fixedly connected to the draft tube (13), a centrifugal fan (27) is fixedly

installed on a bottom of the spiral heat exchange pipe (33), an air outlet of the centrifugal fan (27) is fixedly connected to an outward exhaust pipe (28), a bottom of the catch basin (26) is fixedly connected to a return pipe (31), a check valve (32) is fixedly installed on a middle of the return pipe (31), a thermal insulation water tank (15) is fixedly installed on an end of the return pipe (31), a lifting pump (16) is fixedly installed on a top of the thermal insulation water tank (15), a water outlet of the lifting pump (16) is fixedly connected to a lifting pipe (17), a spray pipe (34) is fixedly installed on a top of the lifting pipe (17), the spray pipe (34) is fixedly installed on a top of an inner wall of the cooling cylinder (14), the centrifugal fan (27) and the lifting pump (16) are electrically connected to the controller (39), a bottom of the thermal insulation water tank (15) is fixedly connected to a heating water pipe (29), and a manual valve (30) is fixedly installed on the heating water pipe (29).

8. The treatment device of claim 1, wherein the charcoal residue collecting mechanism comprises a carbonization storage box (18) and a slag discharge door (19) hinged on the carbonization storage box (18).

9. A treatment method for the kitchen waste with the pyrolysis carbonization using the treatment device of claim 1, comprising:

step 1, draining water from the kitchen waste and crushing the kitchen waste, comprising: pouring the kitchen waste to be treated into the feeding mechanism, and draining water from the kitchen waste and crushing the kitchen waste by the feeding mechanism to obtain the crushed kitchen waste;

step 2, feeding and pyrolyzing the crushed kitchen waste, comprising: driving the crushed kitchen waste into the pyrolysis furnace body by the front spiral feeding mechanism (4), and pyrolyzing the crushed kitchen waste in the pyrolysis furnace body to obtain the pyrolyzed kitchen waste charcoal residues;

step 3, cleaning the pyrolyzed kitchen waste charcoal residues, comprising: transporting the pyrolyzed kitchen waste charcoal residues into the charcoal residue collecting mechanism automatically by the back spiral feeding mechanism (20), and collecting the pyrolyzed kitchen waste charcoal residues; and

step 4, recovering the pyrolyzed kitchen waste charcoal residues, comprising: opening the charcoal residue collecting mechanism to collect and reuse the pyrolyzed kitchen waste charcoal residues centralized in the charcoal residue collecting mechanism.

10. The treatment method of claim 9, wherein in the step 2, exhaust gas produced during the pyrolyzing enters the dust removal mechanism for filtration and purification to obtain purified exhaust gas, and the purified exhaust gas is introduced into the waste heat recovery mechanism to recover heat in the purified exhaust gas.