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**KITCHEN WASTE TREATMENT SYSTEM.**

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A kitchen waste treatment system that fully releases the oil inside the kitchen waste through heating and stirring. Since the density of oil is lower than that of water, the oil floats on the water surface, laying a foundation for subsequent extraction. The system utilizes an oil concentration meter to detect the oil-water interface, and then extracts the oil through a liquid inlet pipe, effectively recovering the oil from the waste. Additionally, the invention employs a perforated filter plate to compress solids, creating a clear boundary between solid and liquid. The liquid is then discharged through another liquid inlet pipe to achieve rapid solid-liquid separation, avoiding any interference of the liquid with subsequent pulping processes. In the pulping machine, a retractable pulping component can retract upon encountering hard objects, guiding them to a hard object discharge pipe for removal, thereby achieving effective hard object elimination. Finally, the invention uses steam to quickly cook the solid powder for sterilization and cooking, followed by fermentation and puffing to produce feed. The entire process is relatively simple and convenient to operate. FIG.1

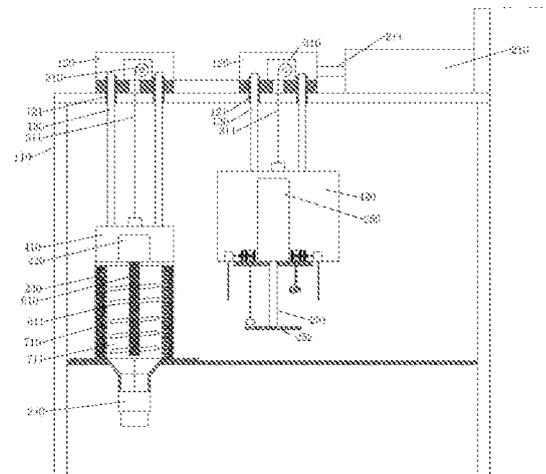


FIG.1

## KITCHEN WASTE TREATMENT SYSTEM

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### Technical Field

The present invention relates to kitchen waste treatment technology, particularly  
5 to a kitchen waste treatment system.

### Background Technology

Kitchen waste possesses certain recyclability. Typically, it undergoes solid-liquid  
separation, with the liquid fermented into fertilizers and the solid fermented into feed  
10 or fertilizer. In the process of treating kitchen waste, oil removal is crucial because oil  
can clog pipelines, hinder oil-water and solid-liquid separation upon solidification, and  
increase the failure rate of subsequent fermentation. Moreover, during the process of  
fermenting solid waste into feed, it is necessary to grind the waste into slurry, which  
involves the removal of hard objects such as bones, glass, and stones from the kitchen  
15 waste. How to effectively eliminate these hard objects remains a technical challenge  
to be addressed.

Therefore, resolving the issues of oil removal from kitchen waste and the effective  
elimination of hard objects is an urgent technical problem.

### 20 Summary of the Invention

In view of the aforementioned defects in the prior art, the technical problem to  
be solved by the present invention is to provide a kitchen waste treatment system  
capable of effectively removing oil from kitchen waste.

To achieve the above objective, the present invention provides a kitchen waste  
25 treatment system, comprising:

An oil removal section for separating oil and water from kitchen waste;

A pulping machine for grinding kitchen waste into slurry;

A settling tank for standing the waste slurry to separate solids and liquids, and  
discharging the solids and liquids separately;

30 A dewatering machine for squeezing the solids separated by the settling tank;

A sterilization section for conveying the solids squeezed by the dewatering

machine, and cooking and sterilizing them;

A mixing tank for mixing the sterilized powder with strains;

A fermentation tank for fermenting the powder mixed with strains;

An expansion section for conveying the fermented powder and heating it for  
5 expansion;

The oil removal section comprises a support frame and a separation tank, with the separation tank mounted on the support frame. The interior of the separation tank forms a separation tank chamber.

The support frame is equipped with two operating sections, each operating  
10 section comprising an operation frame. The operation frame includes a reel, with one end of a steel cable fixedly assembled and wound around the reel. The operation frame also includes a shaft sleeve assembled with a guide shaft.

One operating section comprises a stirring frame fixedly assembled with the corresponding steel cable and guide shaft. The stirring frame is equipped with a stirring  
15 motor, with the output shaft of the stirring motor assembled with a stirring shaft. Stirring blades are mounted on the stirring shaft.

The other operating section comprises a discharge frame fixedly assembled with the corresponding steel cable and guide shaft. The discharge frame includes two  
20 discharge modules and an oil cylinder, with the cylinder shaft of the oil cylinder fixedly assembled with a perforated filter plate. The perforated filter plate is provided with several through holes. The perforated filter plate and the stirring blades selectively enter the separation tank chamber.

The beneficial effects of the present invention are:

The present invention releases the oil inside the kitchen waste through heating  
25 and stirring. Since oil has a lower density than water, it floats on the water surface, laying a foundation for subsequent extraction. The oil-water interface is detected using an oil concentration meter, and oil is extracted through an inlet pipe to effectively recover oil from the waste. The invention also employs a perforated filter plate to compress solids, forming a clear solid-liquid boundary. Another inlet pipe is then used  
30 to discharge the liquid, achieving rapid solid-liquid separation and preventing liquid from affecting subsequent pulping. In the pulping machine, retractable pulping components can contract when encountering hard objects, guiding them to a hard

object discharge pipe for removal, thereby achieving effective elimination of hard objects. Finally, steam is used to quickly cook and sterilize the solid powder. After fermentation and expansion, the result is feed production. The entire process is relatively simple and convenient to operate.

5

### **Description of the Drawings**

FIG.1: Structural schematic of the oil removal section.

FIG.2: Structural schematic of the perforated filter plate entering the separation tank.

10 

FIG.3: Enlarged view of area F1 in FIG.2.

FIG.4: Structural schematic of the pulping machine.

FIG.5: Enlarged view of area F2 in FIG.4.

FIG.6: Structural schematic of the sterilization section, mixing tank, fermentation tank 910, and expansion section.

15 

FIG.7: Structural schematic of the expansion section.

### **Detailed Embodiments**

The technical solutions in the embodiments of the present invention will be described clearly and completely below in conjunction with the accompanying drawings.

20

Referring to FIGs. 1 to 7, the kitchen waste treatment system of this embodiment comprises:

An oil removal section for separating oil and water from kitchen waste;

A pulping machine for grinding kitchen waste into slurry;

25 

A settling tank for standing the waste slurry to separate solids and liquids and discharging the solids and liquids separately;

A dewatering machine for squeezing the solids separated by the settling tank;

A sterilization section for conveying the solids squeezed by the dewatering machine and cooking and sterilizing them;

30 

A mixing tank for mixing the sterilized powder with strains;

A fermentation tank 910 for fermenting the powder mixed with strains;

An expansion section for conveying the fermented powder and heating it for

expansion.

The oil removal section comprises a support frame 110 and a separation tank 710. The separation tank 710 is mounted on the support frame 110, and its interior forms a hollow separation tank chamber 711. A discharge valve 240 is installed at the bottom  
5 of the separation tank 710, which allows the discharge of waste from the separation tank chamber 711 when opened.

An electric heating wire 230 is wound around the outer wall of the separation tank 710. When energized, the electric heating wire 230 generates heat to warm the waste inside the separation tank chamber 711, melting the oil to facilitate oil-water  
10 separation.

Two operating sections are installed on the support frame. Each operating section comprises an operation frame 120. The operation frame 120 is equipped with a reel 310, which is fixedly assembled and wound with one end of a steel cable 311. The reel 310 is mounted on the output shaft of a reel motor. When the reel motor is activated,  
15 it drives the reel 310 to rotate, thereby releasing or winding the steel cable 311. The operation frame 120 also includes a shaft sleeve 121 that is axially slidable along a guide shaft 130. The operation frame 120 is assembled at one end of an electric cylinder shaft 211. The other end of the electric cylinder shaft 211 is inserted into an electric cylinder 210 mounted on the support frame 110. The operation frame 120 is  
20 slidably installed on the support frame. During operation, the electric cylinder drives the operation frame 120 to slide, enabling the positional switching of the two operating sections relative to the separation tank 710. Consequently, only one of the two operating sections can engage with the separation tank 710 at a time.

One operating section comprises a stirring frame 410. The stirring frame 410 is  
25 fixedly assembled with the corresponding steel cable 311 and guide shaft 130. A stirring motor 220 is mounted on the stirring frame 410, and the output shaft of the stirring motor 220 is assembled with a stirring shaft 610. Stirring blades 611 are installed on the stirring shaft 610. The stirring blades can be inserted into the separation tank chamber 711. When the motor is activated, it stirs the waste in the  
30 separation tank chamber 711 to accelerate the release of oil.

The other operating section comprises a discharge frame 420. The discharge frame 420 is fixedly assembled with the corresponding steel cable 311 and guide shaft

130. Two discharge modules are mounted on the discharge frame 420.

Each discharge module includes a reel frame 430, a pipe wheel 520, and a shaft pipe 510. The reel frame 430 is fixedly mounted on the discharge frame 420. The shaft pipe 510 is rotatably mounted on the reel frame 430. The shaft pipe 510 is hollow, with one end connected to the output shaft of a pipe wheel motor and the other end inserted into a connection cover 530. The connection cover 530 is fixedly mounted on the reel frame 430 and connected to the inlet of a pump 540 through a connection pipe 552. The outlet of the pump 540 is connected to an outlet pipe 553.

The pipe wheel 520 is fixedly sleeved outside the shaft pipe 510, and the interior of the shaft pipe 510 communicates with one end of an inlet pipe 551. The inlet pipe 551 is fixedly assembled with and wound around the pipe wheel 520. When the pipe wheel motor is activated, it drives the shaft pipe 510 to rotate, causing the pipe wheel 520 to release or wind the inlet pipe 551.

One inlet pipe 551 is equipped with a liquid discharge counterweight block 560, while the other inlet pipe 551 is equipped with an oil discharge counterweight block 570. The oil discharge counterweight block 570 is fitted with a probe 580. The probe 580 is electrically connected to the input end of an oil concentration meter via a wire 581. The oil concentration meter detects the oil-water separation interface. The wire 581 is retractable through an electric wire reel along with the corresponding inlet pipe 551, ensuring that the wire 581 remains continuously connected between the oil concentration meter and the probe 580.

The discharge frame 420 is equipped with an oil cylinder 250, and the cylinder shaft 251 of the oil cylinder 250 is fixedly assembled with a perforated filter plate 252. The perforated filter plate 252 is provided with several through holes. Referring to FIG.2, during use, the perforated filter plate 252 is pressed into the separation tank chamber 711 to compress the solid waste inside. The waste is then allowed to stand, facilitating the separation of oil, water, and solids. The inlet pipe 551 connected to the probe is released, and the oil discharge counterweight block 571 moves the probe 580 downward by gravity until the oil-water interface is detected. The corresponding pump is then activated to extract the oil layer. Next, another inlet pipe 551 is released. The liquid discharge counterweight block 560 moves the inlet pipe 551 downward by gravity until it reaches the vicinity of the perforated filter plate 252. The pump is then

activated to extract the liquid layer. Finally, the discharge valve is opened to discharge the remaining solid-liquid mixture into the pulping machine for pulping.

Referring to FIGs. 4 and 5, the pulping machine comprises a housing 720. A filter ring 730 is installed inside the housing 720, and the filter ring 730 is provided with several through filtering holes 731. A rotating disk 750 is mounted on the interior side of the filter ring 730. One end of a feed pipe 741 is connected to the interior side of the filter ring 730, and the other end is connected to the outlet of the discharge valve to guide the waste into the filter ring 730.

The rotating disk 750 is equipped with a mounting plate 760, which has several mounting holes 761 distributed along its circumference. Each mounting hole 761 houses a pulping unit 800. The pulping unit 800 comprises a pulping component 810 and a spacer ring 762. The spacer ring 762 is fixed within the corresponding mounting hole 761. The pulping component 810 is equipped with a sliding shaft 811 and a fine shaft 812. The sliding shaft 811 is sealed and slidably assembled with the mounting hole 761. The fine shaft 812 is sleeved with a spring 830, passes through the spacer ring 762, and is assembled with a nut 820. The fine shaft 812 is slidably assembled with the spacer ring, and the spring 830 applies a pushing force on the sliding shaft 811 away from the spacer ring. The nut 820 cannot pass through the spacer ring. The filter ring 730 is further connected to one end of a hard object discharge pipe 742.

Referring again to FIGs. 4 and 5, during use, the rotating disk rotates clockwise under the drive of a corresponding motor. The solids entering the filter ring 730 are ground by the interaction between the pulping component 810 and the filter ring 730 and then discharged through the filtering holes 731. Hard objects that cannot be ground push the pulping component 810 to compress the spring and move towards the spacer ring. The hard objects are gradually rotated to the hard object discharge pipe 742 for ejection. This design effectively removes hard objects while minimizing the impact on the operation of the pulping machine.

Referring to FIGs. 6 and 7, the slurry from the pulping process enters the settling tank, where it stands to separate into solid and liquid layers. The upper liquid is extracted, and the lower solid-liquid mixture is dewatered by a dewatering machine before being sent to the sterilization section. The sterilization section comprises a conveying module, steam nozzles 861, and air-blowing nozzles 862. The conveying

module includes a sterilization conveyor belt 840. Transport frames 850 are mounted on the sterilization conveyor belt 840. Each transport frame 850 has an internal transport groove 851 and a bottom perforated with transport holes 852. The steam nozzles 861 and air-blowing nozzles 862 are positioned at least in pairs and are located above and below the transport frames 850, respectively. The steam nozzles 861 inject high-temperature steam into the transport frames 850 to cook and sterilize the powder inside. The air-blowing nozzles 862 inject cold air into the transport frames 850 for cooling. The sterilization conveyor belt 840 then flips the transport frames 850 so that their openings face downward, allowing the internal powder to fall into the mixing tank 870. The mixing tank 870 contains a mixing chamber 871. Inside the mixing chamber 871 are mixing blades 881, which are mounted on a mixing shaft 880. The mixing shaft 880 is driven by a mixing motor, causing the mixing blades 881 to rotate and stir the contents, thereby completing the mixing process. The mixing chamber 871 is connected to one end of a strain pipe 872, which supplies strains used for fermentation.

The uniformly mixed powder is transferred to the fermentation tank 910 for fermentation. After fermentation, the powder is sent to the expansion section for expansion.

The expansion section comprises another conveying module and a heating unit 920. The heating unit 920 is located above and below the transport frames 850 and is used to heat the transport frames 850 or the powder inside, causing expansion. In this embodiment, the heating unit 920 can be a microwave generator, which rapidly heats the powder through microwave energy for quick expansion. Alternatively, dry hot air, electric heating tubes, or similar methods may also be used.

## CLAIMS

1. A kitchen waste treatment system, characterized by comprising:

An oil removal section for separating oil and water from kitchen waste;

A pulping machine for grinding kitchen waste into slurry;

5 A settling tank for standing the waste slurry to separate solids and liquids, and discharging the solids and liquids separately;

A dewatering machine for squeezing the solids separated by the settling tank;

A sterilization section for conveying the solids squeezed by the dewatering machine, and cooking and sterilizing them;

10 A mixing tank for mixing the sterilized powder with strains;

A fermentation tank for fermenting the powder mixed with strains;

An expansion section for conveying the fermented powder and heating it for expansion;

15 The oil removal section comprising a support frame and a separation tank, the separation tank being mounted on the support frame, and the interior of the separation tank forming a separation tank chamber;

20 The support frame being provided with two operating sections, each operating section comprising an operation frame, wherein the operation frame is equipped with a reel, the reel being fixedly assembled with and wound around one end of a steel cable; the operation frame being further equipped with a shaft sleeve assembled with a guide shaft;

25 One of the operating sections comprising a stirring frame, the stirring frame being fixedly assembled with the corresponding steel cable and guide shaft, and the stirring frame being equipped with a stirring motor, wherein the output shaft of the stirring motor is assembled with a stirring shaft, and stirring blades are mounted on the stirring shaft;

30 The other operating section comprising a discharge frame, the discharge frame being fixedly assembled with the corresponding steel cable and guide shaft, and two discharge modules and an oil cylinder being mounted on the discharge frame, wherein the oil cylinder shaft of the oil cylinder is fixedly assembled with a perforated filter plate, and the perforated filter plate is provided with several through holes; The

perforated filter plate and the stirring blades selectively enter the separation tank chamber.

2. The kitchen waste treatment system according to claim 1, characterized in that  
5 an electric heating wire is wound around the outer wall of the separation tank, and the electric heating wire generates heat upon being energized to heat the waste inside the separation tank chamber.

3. The kitchen waste treatment system according to claim 1 or 2, characterized in  
10 that the discharge module comprises a reel frame, a pipe wheel, and a shaft pipe, wherein the reel frame is fixedly mounted on the discharge frame, the shaft pipe is mounted on the reel frame, the shaft pipe is hollow, with one end of the shaft pipe assembled with the output shaft of a pipe wheel motor and the other end inserted  
15 into a connection cover, the connection cover being fixedly mounted on the reel frame and connected via a connection pipe to the inlet of a pump, the outlet of the pump being connected to an outlet pipe; the pipe wheel is fixedly sleeved on the outside of the shaft pipe, with the interior of the shaft pipe connected to one end of an inlet pipe, and the inlet pipe being fixedly assembled with and wound around the pipe wheel;

One inlet pipe is provided with a liquid discharge counterweight block, while the  
20 other inlet pipe is provided with an oil discharge counterweight block, and the oil discharge counterweight block is equipped with a probe, wherein the probe is electrically connected via a wire to the input end of an oil concentration meter.

4. The kitchen waste treatment system according to claim 1 or 2, characterized in  
25 that the pulping machine comprises a housing, wherein a filter ring is mounted inside the housing, and the filter ring is provided with several through filtering holes; a rotating disk is mounted inside the filter ring, and one end of a feed pipe is connected to the interior side of the filter ring;

The rotating disk is equipped with a mounting plate, and the mounting plate is  
30 provided with several mounting holes, with each mounting hole housing a pulping unit, wherein the pulping unit comprises a pulping member and a spacer ring, the spacer ring being fixed inside the corresponding mounting hole, and the pulping member

being provided with a sliding shaft and a fine shaft, the sliding shaft being sealed and slidably assembled with the mounting hole, the fine shaft being sleeved with a spring, passing through the spacer ring, and assembled with a nut; The filter ring is further connected to one end of a hard object discharge pipe.

5

5. The kitchen waste treatment system according to claim 1 or 2, characterized in that the sterilization section comprises a conveying module, a steam nozzle, and an air-blowing nozzle, wherein the conveying module includes a sterilization conveyor belt, and a transport frame is mounted on the sterilization conveyor belt, with the steam nozzle and the air-blowing nozzle respectively delivering high-temperature steam and cold air to the transport frame.

10

6. The kitchen waste treatment system according to claim 5, characterized in that the expansion section comprises another conveying module and a heating unit, wherein the heating unit is used to heat the powder inside the transport frame for expansion.

15

## REVENDICATIONS

1. Système de traitement des déchets de cuisine, caractérisé par le fait qu'il comprend :

5 Une section de séparation huile-eau permettant de séparer l'huile et l'eau des déchets de cuisine ;

Un broyeur pour transformer les déchets de cuisine en pulpe ;

Un bassin de décantation permettant de laisser reposer la pulpe pour séparer les solides et les liquides, et d'évacuer séparément les solides et les liquides ;

10 Une machine de déshydratation pour presser les solides séparés par le bassin de décantation ;

Une section de stérilisation pour transporter les solides pressés par la machine de déshydratation et les cuire et stériliser ;

Un réservoir de mélange pour mélanger la poudre stérilisée avec des souches ;

15 Un réacteur de fermentation pour fermenter la poudre mélangée avec des souches ;

Une section d'expansion pour transporter la poudre fermentée et la chauffer pour expansion ;

20 La section de séparation huile-eau comprenant un cadre de support et un réservoir de séparation, le réservoir de séparation étant monté sur le cadre de support, l'intérieur du réservoir formant une chambre de séparation ;

Le cadre de support étant équipé de deux sections d'opération, chaque section d'opération comprenant un cadre opératoire, le cadre opératoire étant équipé d'un

tambour, le tambour étant fixé et enroulé autour d'une extrémité d'un câble en acier ; le cadre opératoire étant en outre équipé d'un manchon d'arbre assemblé avec un arbre de guidage ;

Une des sections d'opération comprenant un cadre d'agitation, le cadre d'agitation étant fixé au câble en acier et à l'arbre de guidage correspondants, et équipé d'un moteur d'agitation, l'arbre de sortie du moteur d'agitation étant assemblé avec un arbre d'agitation, et des pales d'agitation étant montées sur l'arbre d'agitation ;

L'autre section d'opération comprenant un cadre de décharge, le cadre de décharge étant fixé au câble en acier et à l'arbre de guidage correspondants, et équipé de deux modules de décharge et d'un cylindre hydraulique, l'arbre du cylindre hydraulique étant fixé avec une plaque filtrante perforée, la plaque filtrante perforée étant dotée de plusieurs trous traversants ; la plaque filtrante perforée et les pales d'agitation entrant sélectivement dans la chambre du réservoir de séparation.

15

2. Système de traitement des déchets de cuisine selon la revendication 1, caractérisé en ce qu'un fil chauffant électrique est enroulé autour de la paroi extérieure du réservoir de séparation, le fil chauffant électrique produisant de la chaleur lorsqu'il est alimenté pour chauffer les déchets à l'intérieur de la chambre du réservoir de séparation.

20

3. Système de traitement des déchets de cuisine selon la revendication 1 ou 2, caractérisé en ce que le module de décharge comprend un cadre de tambour, une

roue tubulaire et un arbre tubulaire, le cadre de tambour étant fixé sur le cadre de décharge, l'arbre tubulaire étant monté sur le cadre de tambour, l'arbre tubulaire étant creux, avec une extrémité assemblée à l'arbre de sortie d'un moteur de roue tubulaire et l'autre extrémité insérée dans un couvercle de connexion, le couvercle de connexion étant fixé sur le cadre de tambour et connecté par un tuyau de connexion à l'entrée d'une pompe, la sortie de la pompe étant connectée à un tuyau de sortie ; la roue tubulaire étant fixée autour de l'extérieur de l'arbre tubulaire, l'intérieur de l'arbre tubulaire étant connecté à une extrémité d'un tuyau d'entrée, le tuyau d'entrée étant fixé et enroulé autour de la roue tubulaire ;

10 Un des tuyaux d'entrée est équipé d'un contrepoids pour l'évacuation des liquides, tandis que l'autre est équipé d'un contrepoids pour l'évacuation des huiles, ce dernier étant muni d'une sonde, la sonde étant connectée électriquement par un fil à l'entrée d'un mesureur de concentration d'huile.

15 4. Système de traitement des déchets de cuisine selon la revendication 1 ou 2, caractérisé en ce que le broyeur comprend un boîtier, un anneau filtrant étant monté à l'intérieur du boîtier, l'anneau filtrant étant doté de plusieurs trous de filtration traversants ; un disque rotatif est monté à l'intérieur de l'anneau filtrant, et une extrémité d'un tuyau d'alimentation est connectée à l'intérieur de l'anneau filtrant ;

20 Le disque rotatif est équipé d'une plaque de montage, la plaque de montage comportant plusieurs trous de montage, chaque trou de montage abritant une unité de broyage, l'unité de broyage comprenant un élément de broyage et une bague d'

espacement, la bague d'espacement étant fixée dans le trou de montage correspondant, l'élément de broyage étant équipé d'un arbre coulissant et d'un arbre fin, l'arbre coulissant étant assemblé de manière étanche et coulissante avec le trou de montage, l'arbre fin étant entouré d'un ressort, traversant la bague d'espacement et assemblé avec un écrou ; l'anneau filtrant étant en outre connecté à une extrémité d'un tuyau d'évacuation des objets durs.

5. Système de traitement des déchets de cuisine selon la revendication 1 ou 2, caractérisé en ce que la section de stérilisation comprend un module de transport, une buse de vapeur et une buse de soufflage, le module de transport comprenant une bande transporteuse de stérilisation, et un cadre de transport étant monté sur la bande transporteuse de stérilisation, les buses de vapeur et de soufflage délivrant respectivement de la vapeur à haute température et de l'air froid au cadre de transport.

15

6. Système de traitement des déchets de cuisine selon la revendication 5, caractérisé en ce que la section d'expansion comprend un autre module de transport et une unité de chauffage, l'unité de chauffage servant à chauffer la poudre à l'intérieur du cadre de transport pour l'expansion.

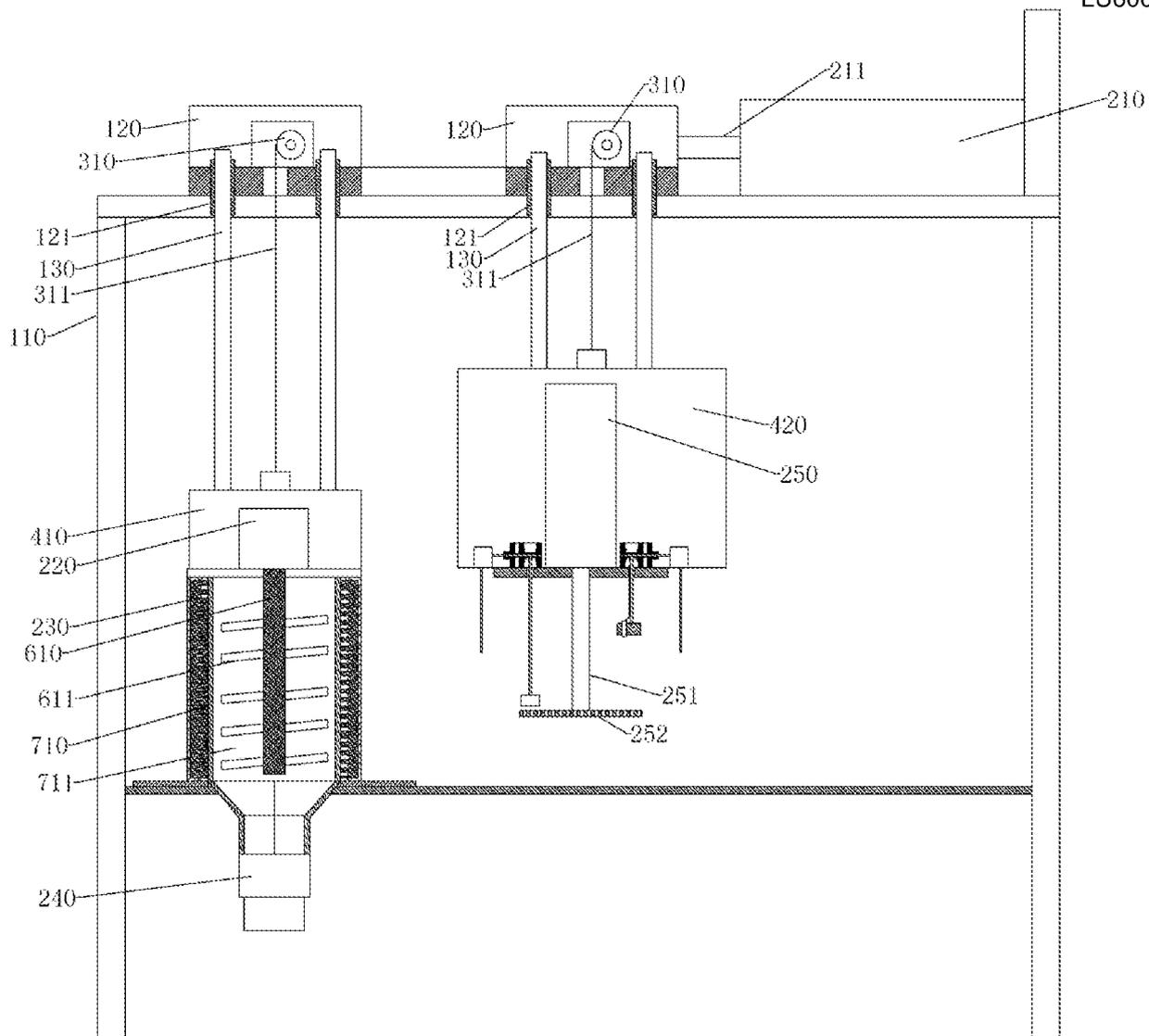


FIG.1

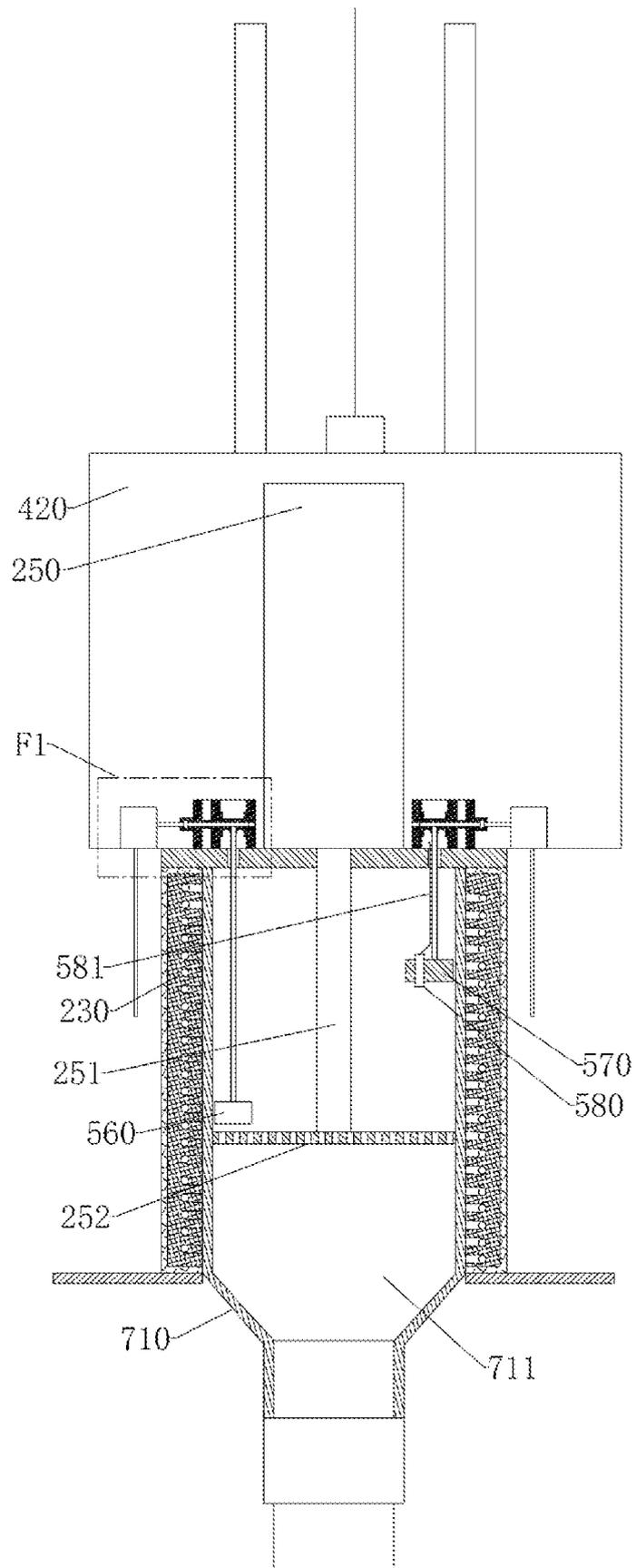


FIG.2

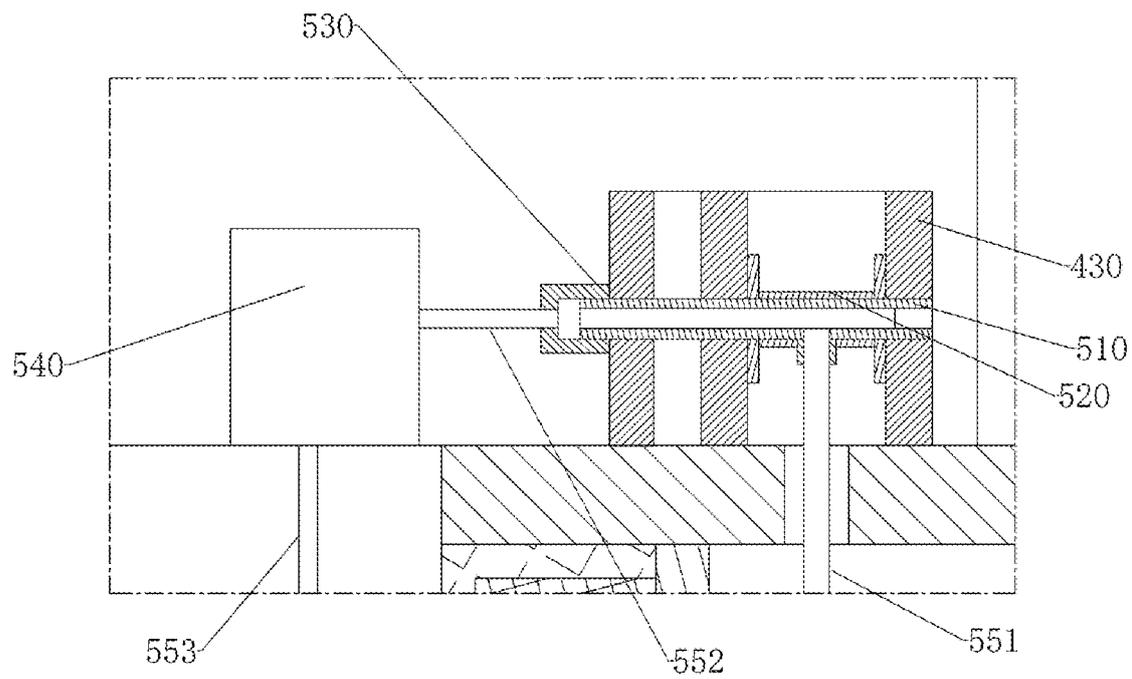


FIG.3

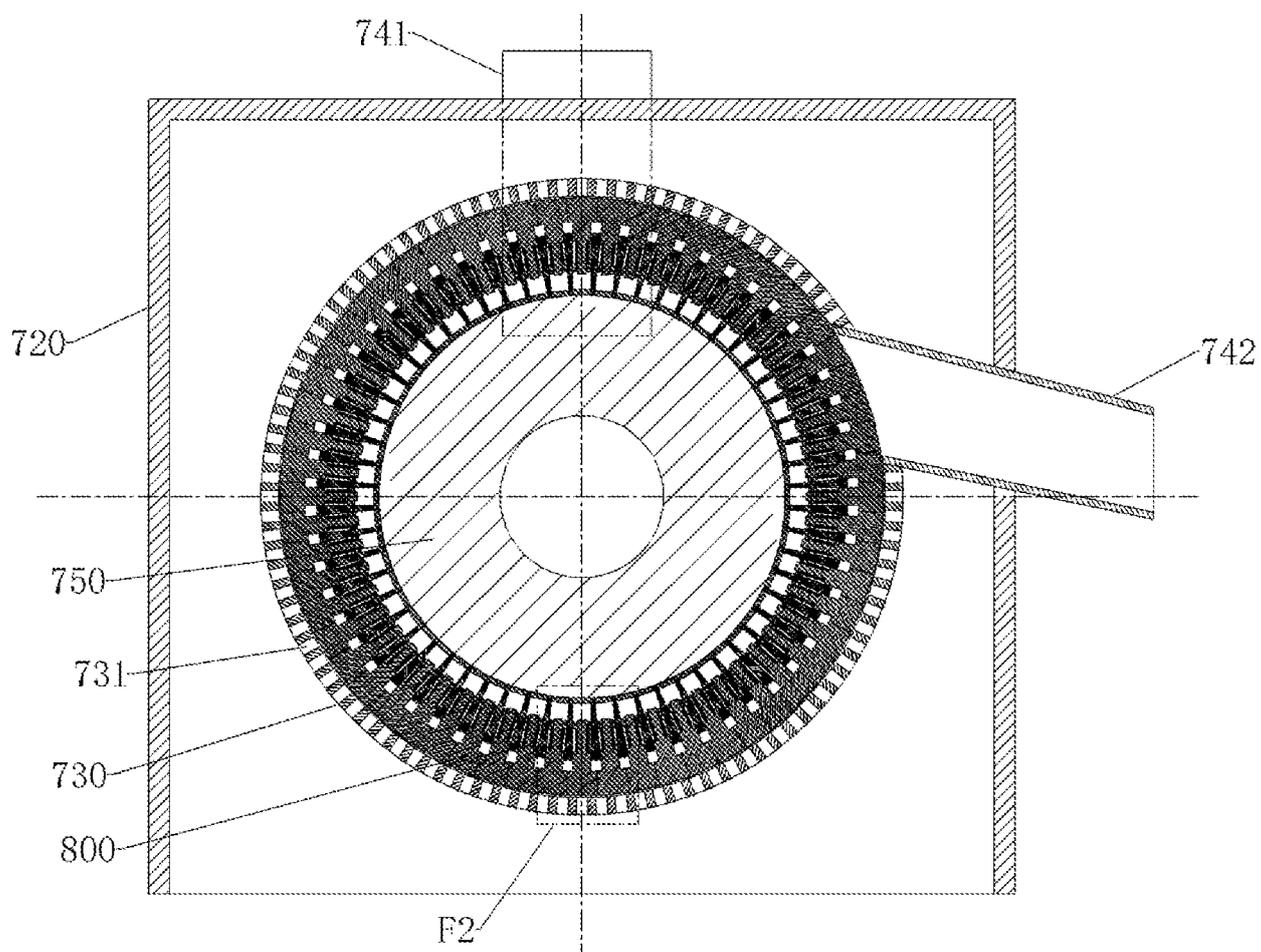


FIG.4

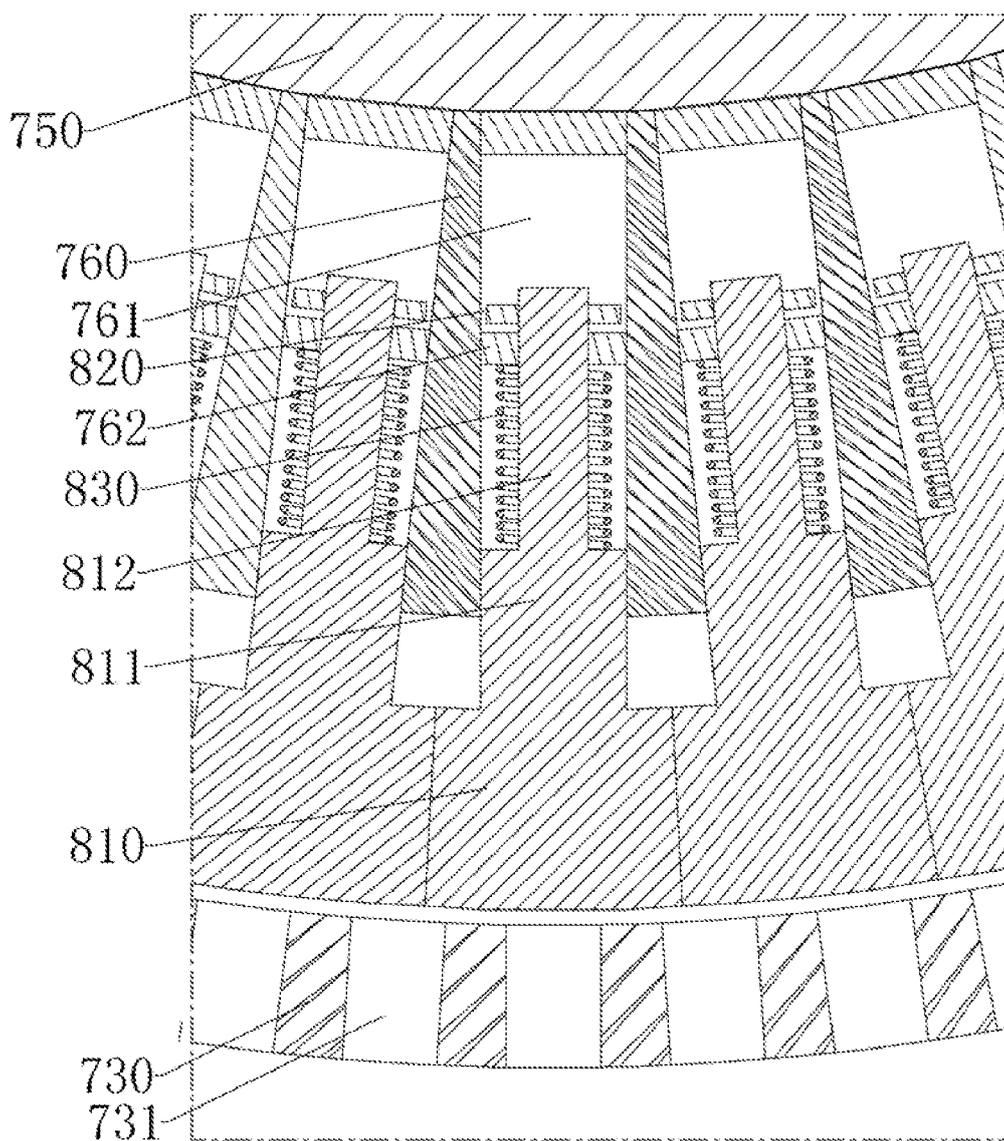


FIG.5

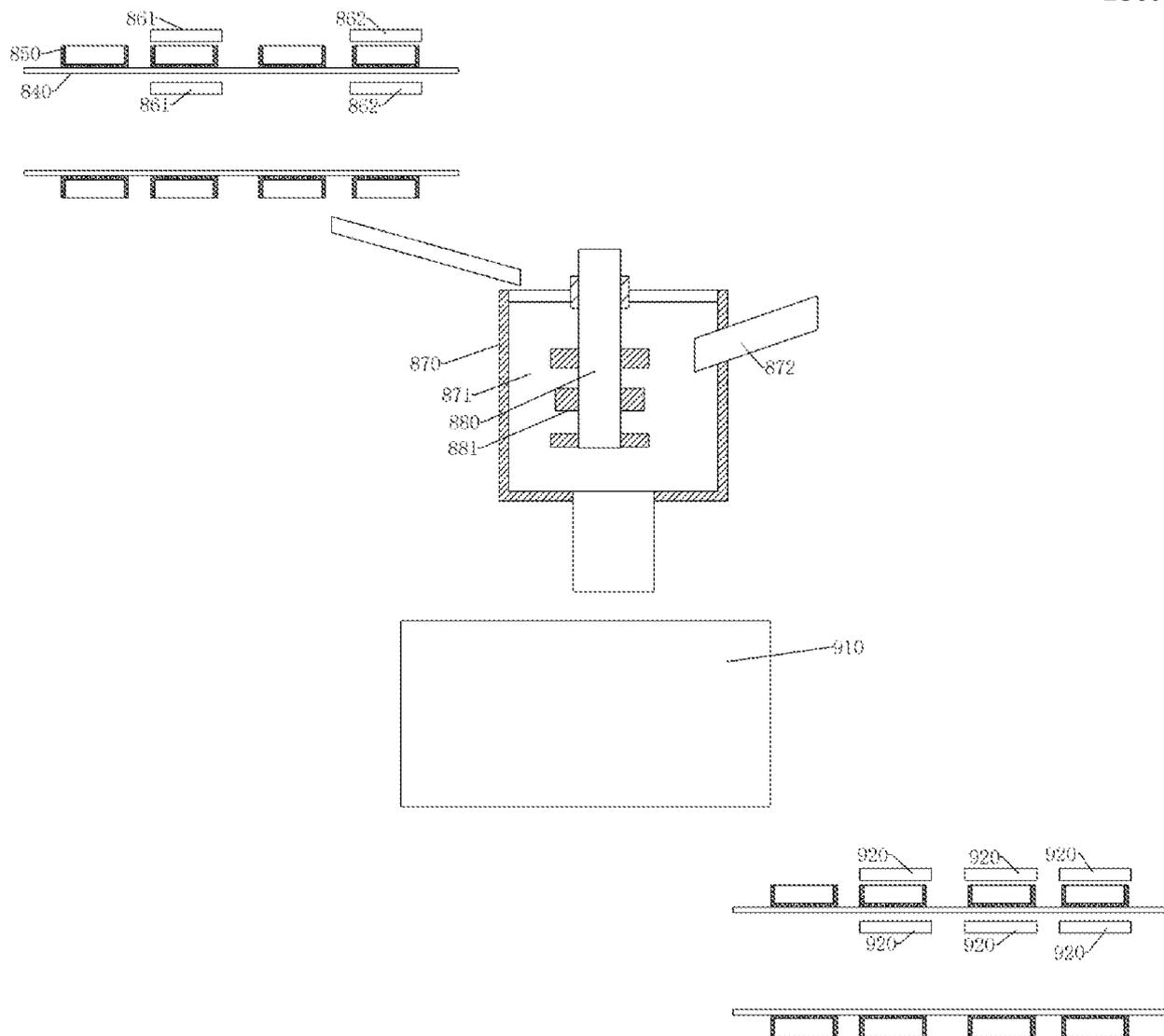


FIG.6

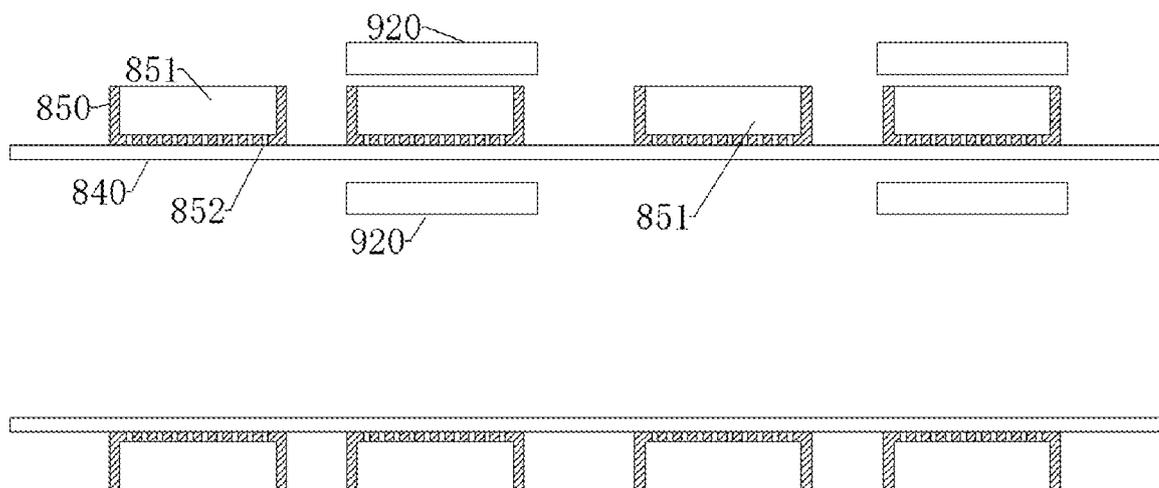


FIG.7