SAFE AND ENERGY-SAVING MICROWAVE VACUUM CONTINUOUS AUTOMATIC DRIER

The present invention relates to a microwave drying machine structure, in particular the structure of the microwave vacuum dryer. A safe and energy-saving automatic continuous microwave vacuum dryer, including the tank (A), the feeding system (8), a vacuum system (9) in the tank (A) is provided with a microwave heating system (1), the main characterized in further comprising a tank (A) equipped with transfer means (6), the transfer means (6) is provided below the feeding device (5); the tank (A) the material is non-metallic materials . Ensuring the strength, toughness, based on the metal to prevent the vacuum state of ignition when heated in a microwave discharge phenomenon. The invention uses microwave radiation heating mode, the use of microwave efficient, easy to control, disinfection, sterilization, rapid heating, heating uniformity, rapid dehydration, preservation characteristics, lower power consumption and improve efficiency.

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A method of microwave energy security automatic continuous vacuum dryer, including the tank (A), the feeding system (8), a vacuum system (9) in the tank (A) is provided with a microwave heating system (1), characterized by further comprising the tank (A) equipped with transfer means (6), the transfer means (6) is provided below the feeding device (5); the tank (A) the material is non-metallic materials.

(2) as claimed in claim 1, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said transfer means (6) comprises the bracket (61) is fixedly connected at both ends of a drive wheel (62) and from wheel (63) on which a drive belt (64), drive wheel (62) on the shaft end of the body by projecting dynamic sealing means (A) connected to the power transmission shaft; its power from the motor shaft (E) driven reducer phase drive.

3 as claimed in claim 1 or 2, wherein the microwave energy security automatic continuous vacuum drying, characterized in that said belt (64) end of an elastic blade (69); the drive belt (64) the lower end a rotatable brush (6a).

4 as claimed in claim 3, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in that said conveying means (6) for the flat-band transmission or transport track.

5 as claimed in claim 4, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said transfer means (6) is a ceramic or a non-metallic material is polytetrafluoroethylene or polypropylene or glass.

As claimed in claim 5, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said belt (64) is made of polypropylene or Teflon or silicone rubber.

As claimed in claim 6, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said transfer means (6) further comprises the drive belt (64) above the bracket (61) is provided with a rolling wheel (65), with the rolling wheel (65) corresponding to a transmission belt (64) below a rolling plate (67).

As claimed in claim 7, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said transfer means (6) further comprises the drive belt (64) above the bracket (61) is provided

with a cutter (66), with the cutting device (66) corresponding to a transmission belt (64) provided below the cutting plate (68).

(10) as claimed in claim 8, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said transfer means (6) comprises the tank (A) 1-8 can be a transferring means (6) .

A process as claimed in claim 9, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said upper feeding system (8) including the tank (A) stirred tank connected by a pipe (81), pump (82) and located in the tank (A) within the conveyor (64) at the top of the tube (83).

As claimed in claim 10, wherein the microwave energy security automatic continuous vacuum drying machine, characterized in said microwave heating system (1) in the tank (A) is provided with a microwave feed inlet (14), which are equipped with non-metallic spacer plate (13), microwave feed inlet (14) is provided with a drive chamber (15), a microwave source (11) and the microwave feed inlet (14) is provided between the waveguide (12); the tank (A) the circumferential rows of microwave feed may be provided with an inlet (14).

12 as claimed in claim 11, wherein the microwave energy security automatic continuous vacuum drying machine, characterized by further comprising a feeding device (5) in the material receiving groove (52) equipped with thrusters (51), the pusher (51) is connected to the outlet end of the vacuum continuously discharging device (53).

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Safety and energy saving automatic continuous microwave vacuum dryer

Technology

: The present invention relates to a microwave drying machine structure, in particular the structure of the microwave vacuum dryer.

BACKGROUND

: Conventional drying, especially in medicine enrichment process, since the extract is generally thick gelatinous material, because of its relatively viscous and difficult to dry inside, so the use of conventional drying methods, such as steam or vacuum drying Drying exist long cycle, power consumption, high temperature, low efficiency, uneven heating, preservation and poor performance shortcomings.To solve these problems, Patent No. 03243669.6, entitled "extract microwave vacuum dryer," the patent discloses a solution in the original basis of vacuum heating, microwave heating increases, the use of microwave energy to pass under the vacuum state is not affected the drug moisture evaporation, to achieve rapid drying purposes. There is a problem of the program material in the heating process, the drying process is not a continuous process, so the efficiency is still relatively low. Can not meet the needs of pharmaceutical production. In addition the program on the microwave tank body material not covered, microwave heating tank body material for the metal material, easy to produce sparks, there is insecurity.

SUMMARY OF THE INVENTION

: The purpose of the present invention is to avoid the shortcomings of the prior art and to provide a safe and energy-saving automatic continuous microwave vacuum dryer.

The object of the present invention can be implemented using the following technical scheme: a safe and energy-saving automatic continuous microwave vacuum dryer, including the tank (A), the feeding system (8), a vacuum system (9) in the tank (A) is provided with a microwave heating system (1), its main feature is also included in the tank (A) equipped with transfer means (6), the transfer means (6) is provided below the feeding

device (5); the tank (A) the material is non-metallic materials. Ensuring the strength, toughness, based on the metal to prevent the vacuum state of ignition when heated in a microwave discharge phenomenon.

The microwave energy security automatic continuous vacuum dryer transfer means (6) comprises the bracket (61) is fixedly connected at both ends of a drive wheel (62) and the driven wheel (63) on which a drive belt (64), drive wheel (62) on the shaft end protruding through the body seals (A) and connected to the power transmission shaft; its power from the motor shaft (E) driven phase drive gear.

The invention also includes the drive belt (64) end of an elastic blade (69); the drive belt (64) rotates the lower end of a brush (6a).

Said microwave energy security automatic continuous vacuum dryer transfer means (6) for the flat-band transmission or transport track.

Transfer means (6) is a ceramic or a non-metallic material is polytetrafluoroethylene or polypropylene or glass. Said belt (64) is made of polypropylene or Teflon or silicone rubber.

Said microwave energy security automatic continuous vacuum dryer transfer means (6) further comprises the drive belt (64) above the bracket (61) is provided with a rolling wheel (65), with the rolling wheel (65) the corresponding belt (64) below a rolling plate (67). When the discharge pipe (83) of the material spread on the belt (64), and by the rolling plate (67) with the rolling wheel (65) of the material rolling smooth, uniform, uniform drying it.

Said microwave energy security automatic continuous vacuum dryer transfer means (6) further comprises the drive belt (64) above the bracket (61) is provided with a cutter (66), with the cutting device (66) corresponds to transmission belt (64) provided below the cutting plate (68). The cutter (66) is a toothed blade, can be laid on the belt (64) on the axial or radial cutting material, the thick gel-like material into strips or cut into pieces, to dry, and help bring the material from the shovel down.

Said conveying means (6) comprises the tank (A) 1-8 can be a transferring means (6). The device is set to 1-3 columns, each column can be arranged in parallel.

Safety and energy saving automatic continuous microwave dryer vacuum feeding system (8) includes the tank (A) connected by a pipe stirred tank (81), pump (82) and located in the tank (A) within the conveyor belt (64) above the discharge pipe (83).

Microwave heating system of the present invention (1) in the tank (A) is provided with a microwave feed inlet (14), which are equipped with non-metallic spacer plate (13), microwave feed inlet (14) is provided with a drive chamber (15), microwave source (11) and the microwave feed inlet (14) is provided between the waveguide (12); the tank (A) may be provided in the circumferential rows of microwave feed inlet (14).

The safety and energy saving automatic continuous microwave vacuum drying machine also includes a feeding device (5) to undertake the material slots (52) are equipped with thrusters (51), propeller (51) is connected to the outlet end of a continuous vacuum feeding means (53). The device has been patented.

In actual production, there are many items that can not be dried under high temperature conditions, such as some medicines, chemicals, nutritional food and ginseng, velvet and other high-grade herbs. To ensure the quality of products, the drying process must be less than 100 ℃ or room temperature conditions. Is well known, pressure reduction, boiling point of water is reduced, as in an atmospheric pressure (101.3kp), the boiling point of water is 100 ℃ and 0.073 atm, the boiling point of water is 40 ℃, under vacuum conditions, the heated object to make the subject In the absence of internal moisture evaporation temperature condition. Under the conditions of the vacuum air flow difficult, and only rely conduction mode to provide heat to the material, conventional vacuum drying method conduction velocity is very slow, inefficient, and difficult to control the temperature, the

material is heated temperature difference will produce. The microwave heating is a radiant heating, microwave directly interact with the material to be heated both inside and outside, not by convection or conduction to transfer heat, so the heating speed, high drying efficiency, dry mass is high. To maximize the preservation of material activity and food vitamins, original color and nutrients effect.

Using microwave radiation heating methods, the use of microwave efficient, easy to control, disinfection, sterilization, rapid heating, heating uniformity, rapid dehydration, preservation characteristics, lower power consumption and improve efficiency.

With other drying techniques and drying equipment, compared with the following characteristics: 1. Efficient: conventional vacuum drying equipment, (assuming vacuum pressure 7.37kpa, material dehydration temperature 40 ℃, 1kg heat of water vapor is 574 kcal) due to the vacuum applications, the heat transfer by convection is very difficult, can be conducted, the heating speed is slow, long drying cycle, energy consumption. Microwave vacuum drying equipment is used in radiation energy transfer, is the whole medium heat, no other heat transfer media, to avoid the above drawbacks, so fast, high efficiency, greatly shorten the drying cycle, reduce energy consumption. Compared with conventional drying technology can improve the efficiency more than four times.

(2) Easy control: Because of the design of the transfer device (6) to facilitate continuous production and automation, microwave power with a quick adjustment and without inertia characteristics, easily controlled in time, to facilitate the adjustment of process parameters and determined.

3 In addition microwave equipment disinfection, sterilization efficacy, product safety and health, prolong shelf life 2-5 times.

4 uniform heating: no matter how the shape of each part of the object, which is the object table at the same uniform penetration of electromagnetic waves (microwaves) to generate heat. Unlike conventional heating that is generated outside the focus of endogenous phenomenon.

5 dehydrated quickly: Since microwave heating speed, there is a fast dehydration factor. The vacuum freeze-drying method, while also have this condition, however, because the material is, in icing conditions, through the water sublimation Dehydration, sublimation process is very slow, rapid dehydration effect can not be achieved. Therefore, the freeze-drying dehydration cycle is too long, there is a large energy-consuming, so lyophilization in the food and pharmaceutical industries for a wide range of application has been greatly hampered.

6 Energy efficient: the substance contains water to absorb microwaves and heat, therefore, in addition to a small amount of transmission loss, almost no other losses. Therefore, high thermal efficiency, energy saving. Far infrared heating energy than the one-third or more.

7 mold, sterilization, and preservation: Microwave heating with thermal and biological effects can be sterilized at a lower temperature and mildew. Since the heating speed, short time, to maximize the active material and food preservation of vitamins, the original color and nutrients of the food being processed have a truly natural green food harmless nature.

8 harmless: As the microwave is controlled by the metal container and the waveguide in order to effectively prevent the leakage of microwave. In the tank (A) within the non-metallic materials used as the material, to ensure the strength, toughness, based on the metal to prevent the vacuum state of ignition when heated in a microwave discharge phenomenon.No radiation hazards and harmful gas emissions, does not produce heat and dust pollution, that does not contaminate food not pollute the environment.

9 product quality in line with the national GMP requirements, but also due to the freezing conditions crushing, crushing fully retained an active ingredient, a very competitive market.

BRIEF DESCRIPTION

: Below in conjunction with the preferred embodiments shown in the drawings further detail: Figure 1 is a first embodiment of the front view of FIG.

Figure 2 is a sectional view BB of Figure 1.

Figure 3 is a second embodiment of the invention, transfer means (6) Fig.

Figure 4 is a third embodiment of the front view of FIG.

Figure 5 of the present invention the microwave heating system (1) in FIG.

Specific embodiments

: Example 1: Figure 1, Figure 2, Figure 5, the microwave energy security automatic continuous vacuum dryer, including the tank A, the feeding system 8, a vacuum system 9, the tank A, a microwave heating system 1 In tank A equipped with transfer means 6, the transfer unit 6 is provided below the feeding apparatus 5; material A in which the tank is polytetrafluoroethylene or polypropylene. Transfer means 6 comprises at both ends of the bracket 61 is fixedly connected with the driving wheel 62 and the driven wheel 63, which is provided with a transmission belt 64, the driving wheel 62 on the shaft end protruding through the tank A dynamic sealing means and the power transmission shaft connected; their power shaft driven by a motor reducer E-phase drive. At the end of the belt 64 and an elastic blade 69; at the lower end of the belt 64 has a rotating brush 6a. 6 is a flat belt conveyor transport or transport track. There is a computer in the tank A video surveillance system 7.

The material transfer device 6 is polytetrafluoroethylene or polypropylene. The belt conveyor 64 is made of PTFE or polypropylene or a silicone rubber conveyor belt.

Transfer means 6 in the top of the belt 64 of the stent 61 is provided with a rolling wheel 65, the rolling wheel 65 and the belt 64 corresponding to the bottom plate 67 has rolled.

Transfer means 6 in the top of the belt 64 is provided with a cutter holder 61 66, 66 in the cutting belt 64 corresponding to the cutting plate 68 is provided below.

A transfer device 6 in the tank is set to 1, 2 parallel to each column group.

Feeding system 8 are connected to the tank A pipe stirred tank 81, pump 82 and located within the conveyor 64 in the tank top A discharge pipe 83.

Microwave heating system A in the tank 1 is provided with a microwave feed inlet 14, which are equipped with non-metallic spacer plate 13, a microwave feed inlet 14 is provided with a drive chamber 15, the microwave source 11 and the feed inlet 14 is provided between the microwave waveguide 12; along the circumference of the tank A row can have multiple microwave feed inlet 14.

A feeding device 5 in receiving material tank 52 equipped with thrusters 51, propeller 51 is connected to the outlet end of a continuous vacuum discharge device 53.

Example 2: Figure 3, the transmission device 6 are the track transfer. Rest of the structure as in Example 1.

Example 3: Figure 4, the transmission means 6 in the tank A is set to 1, 8 parallel to each column group. Rest of the structure as in Example 1.

Example 4: Figure 1, Figure 2, Figure 5, the microwave energy security automatic continuous vacuum dryer equipped with the tank A partition plate 2, the side of the partition plate 2 and the cooling device 3 has a suppressor 4. Rest of the structure as in Example 1. This structure has the same date patented.

The invention process is to first vacuum pumping chamber and preheating stirred tank, the material to be processed and then sucked into the vacuum system by the agitator, the agitator of the material by a preheating stir, stir the material transported through the pump to be closed The tank body of the conveyor belt, and then uniformly heated by the microwave generator, the material uniformly compacted by rolling wheel into a pie, the

use of vacuum and microwave heating, the water is heated in the temperature rise inside the object state evaporation, The large amount of water vapor generated by the vacuum system supporting out, because the microwave heating chamber isolation, so there is no microwave leakage, it will not absorb too much suppression device of the microwave, resulting in energy loss, the evaporation process is completed, material into the propeller, the propeller of the material by a push to double the feeding system, thus ensuring the continuity of the material.During operation, the operator can monitor the system (7) real-time monitoring production processes, drying is complete, select the reign of cleaning procedures cavity by the nozzle cleaning, washing water is discharged via the hydrophobic device A2 until the cleaning is completed, the entire production workflow is complete.

Application Example: a cold cold dry extract extract, 10 kg, 43% moisture content before drying. The invention microwave power 10kw, vacuum 0.08MP, temperature 47 ℃, run time 20 minutes. Into a powder, an aqueous 4%.