

ULTRAFINE POWDER SIEVING MACHINE WITH BI-DIRECTIONAL AIRFLOW

FIELD OF THE INVENTION

[0001] The invention relates to a screening machine for superfine powder, and more particularly to a screening machine having bi-directional airflow for superfine powder.

BACKGROUND OF THE INVENTION

[0002] Powder technology is one of the most important basic technologies in high and new technology industries and pharmaceutical industries in recent years. The superfine-treatment of powder changes a lot of the original properties of material, thus the application range of traditional materials is extended, and the application value of products is promoted. Therefore, improving the powder classification technology is of great importance. The powder separation and classification equipment is developing rapidly in recent years, and currently, there are two main commonly-used types: classification with a mesh screen, and classification without a mesh screen. The air screening method is a more advanced classification method, and the biggest advantage of an air screening machine is using a screen mesh for effective separation under the impact of air carried with powder, however, the shortage is that the micron-size materials with light weight and small particle size are accumulated on the mesh screen during classification to form caking to block the mesh screen, thus the screening operation cannot be performed. For example, Chinese Patent Publication No. 101844133A discloses a micron-size powder material air screening device which adopts the principle of circulating dual airflow, but the middle part of the mesh screen is easily blocked due to the uneven reverse airflow, the area of the mesh screen is small under the same volume,

the air screening device is not suitable for large-scale production, and meanwhile, the air screening device is complicated in structure and high in energy consumption. At present, the commonly-used turbine classifier is mainly suitable for the materials with monomer component, for example, the large-scale production of mineral superfine powder, however, it's not suitable for the mixed powder with complicated component, for example, the screening production of plant superfine powder with high difference in specific gravity of various components, because the maximum particle size is not easy to be controlled accurately.

SUMMARY OF THE INVENTION

[0003] In view of the above-described problems, it is one objective of the invention to provide a screening machine for superfine powder that is advantageous in high screening efficiency, large effective area of a screen mesh, long service life, convenience in replacement of the screen mesh, simple structure of equipment, and low energy consumption, and is suitable for industrial production.

[0004] To achieve the above objective, the following technical schemes are provided.

[0005] A screening machine for superfine powder comprises a casing. A screen drum is disposed in a middle part of an inner cavity of the casing; an opening of the screen drum is arranged on a bottom of the screen drum and communicates with an upper opening of a funnel. The funnel is disposed beneath the casing. The inner cavity of the casing communicates with an external induced draft fan via a negative pressure chamber disposed on an upper part of the casing. A rotary air spray pipe comprising a transverse pipe and a vertical pipe is arranged in a space between the screen drum and the casing. The rotary air spray pipe is in a shape of a Chinese character “men”; a middle part of the transverse pipe is connected via a transmission with a drive motor. A blast pipe is arranged vertically in a middle part of the screen drum; an air outlet of the blast pipe

passes through the screen drum and is connected to the middle part of the transverse pipe of the rotary air spray pipe; the air outlet of the blast pipe is in rolling connection with the transverse pipe via a rolling bearing. An air inlet of the blast pipe stretches outside a sidewall of the funnel and communicates to a blast orifice of an external blast blower. A feed pipe is arranged inside the screen drum; a feed outlet of the feed pipe is arranged beneath a buffering umbrella; and a feed inlet of the feed pipe stretches outside the sidewall of the funnel.

[0006] Air jet holes of the rotary air spray pipes are formed by axially arranging grooves on pipe walls of the transverse pipe and the vertical pipe, respectively. An opening of each groove is arranged facing the screen drum.

[0007] Air jet holes of the rotary air spray pipes are formed by axially arranging a plurality of strip holes on pipe walls of the transverse pipes and the vertical pipes at intervals, respectively. An opening of each of the strip holes is arranged facing the screen drum.

[0008] Two rotary air spray pipes are provided and arranged in the space between the screen drum and the casing; and the transverse pipes of the two rotary air spray pipes are mutually crossed and perpendicular.

[0009] Advantages of the invention are summarized as follows:

[0010] 1. During the powder screening process, air classification and classification with a mesh screen are carried out at the same time, and due to the arrangement of the rotary air spray pipes outside a screen drum, uniform airflow blowing into the screen drum is generated on the outer peripheral surface of the screen drum, thus the phenomenon that the micron-size materials with light weight and small particle size are accumulated on a mesh screen to form caking to block screen openings is avoided, and the powder classification efficiency is improved greatly; therefore, the technical guarantee is provided for the superfine-treatment (the particle size of the

powder after superfine-treatment is equal to or smaller than 25 microns) of powder, and the large-scale industrial production is realized for the operation of screening the superfine powder (above 500-mesh).

[0011] 2. By adopting the structural design of the screening machine, a screen drum structure can be selected for a screening component, and the screening area of the screen drum is bigger than that of the screen plate under the condition of given volume of the screening device, thus the screening efficiency is improved.

[0012] 3. The materials are sieved under the guidance of airflow from the induced draft fan, and the air-drying effect of materials is generated during the screening process, thus the external drying apparatus is saved, and the energy consumption is reduced.

[0013] 4. The screening machine has a simple structure, is convenient for the screen drum to replace, and easy to repair and maintain.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a structure diagram of a bidirectional superfine powder air screening machine in accordance with one embodiment of the invention;

[0015] FIG. 2 is a structure diagram of an air jet hole of a transverse pipe of a the rotary air spray pipe being a structure of a groove in accordance with one embodiment of the invention;

[0016] FIG. 3 is a structure diagram of an air jet hole of a vertical pipe of a the rotary air spray pipe being a structure of a groove in accordance with one embodiment of the invention;

[0017] FIG. 4 is a structure diagram of an air jet hole of a transverse pipe of a rotary air spray pipe being a structure of strip holes in accordance with one embodiment of the invention; and

[0018] FIG. 5 is a structural diagram of an air jet hole of a vertical pipe of a rotary air spray pipe being a structure of strip holes in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] As shown in FIG. 1, a screening machine for superfine powder comprises a casing 1. A screen drum 2 comprising an opening downward is arranged in a middle part of an inner cavity of the casing 1, and the opening of the screen drum 2 is communicated with an upper opening of a funnel 3, and the funnel is arranged beneath the casing 1. The inner cavity of the casing 1 is communicated with an external induced draft fan 5 via a negative-pressure room 4 arranged on an upper part. Two rotary air spray pipes substantially in the shape of a Chinese character “men” are arranged in a space between the screen drum 2 and the casing 1. Each rotary air spray pipe comprises: a transverse pipe 6, and a vertical pipe 7. The transverse pipes 6 of the two rotary air spray pipes are mutually crossed and perpendicular, mutually communicated and fixed. A middle of each transverse pipe 6 of the rotary air spray pipe is connected via a transmission with a driving motor 8. A blast pipe 9 is vertically arranged in a middle part of the screen drum 2. An air outlet of the blast pipe 9 passes through the screen drum 2 to be communicated with the middle of the transverse pipe 6 of the rotary air spray pipe, and is in rolling connection with the transverse pipe 6 of the rotary air spray pipe via a rolling bearing 10. An air inlet of the blast pipe 9 extends out of a sidewall of the funnel 3 and is communicated with a blast orifice of a blast blower 11. A feed pipe 12 is arranged inside the screen drum 2. A buffer umbrella 13 is arranged above a feed outlet of the feed pipe 12. A feed inlet of the feed pipe 12 extends out of the sidewall of the funnel 3 and is communicated with an air outlet of a powder conveying blower 17 through an airlock 16.

[0020] As shown in FIG. 2 and FIG. 3, grooves are axially arranged on pipe walls of the transverse pipe 6 and the vertical pipes 7, respectively, to form air jet holes. An opening of each groove is arranged facing the screen drum 2. A width of the groove 14 is 0.5-2 mm.

[0021] As shown in FIG. 4 and FIG. 5, air jet holes of the rotary air spray pipes is formed by axially arranging a plurality of strip holes 15 on the pipe walls of the transverse pipes 6 and the vertical pipes 7 at intervals, respectively. Openings of the strip holes 15 are arranged facing the screen drum 2.

[0022] Working principle of the invention is as follows:

[0023] As shown in FIGS. 1-5, during the working process, the powder conveying blower 17, the induced draft fan 5 and the driving motor 8 are started first. The blowing pressure of the powder conveying blower 17 is 24 kPa, and the amount of blowing air is 150 m³/h; the induced draft pressure of the induced draft fan 5 is 1000 Pa, and the amount of induced air is 3000 m³/h; the blast pressure of the blast blower 11 is 33 kPa, and the blast volume is 320 m³/h; the rotational speed of the driving motor 8 is 155 revolutions per minute.

[0024] 1. The powder to be classified is carried into the screen drum 2 under the action of high-speed air flow of the powder conveying blower 17 after passing through the airlock 16 and the feed pipe 12, the impact force is reduced by the buffering umbrella 13. The powder to be classified is dispersed in the screen drum 2. The screen drum 2 adopts a 500-mesh mesh screen.

[0025] 2. The powder dispersed in the screen drum 2 is classified in the screen drum 2 in the presence of the induced draft fan 5. Fine powder being capable of passing through the screen drum 2 is collected by the negative-pressure room 4 due to the negative pressure. Coarse powder which fails to pass through the screen drum 2 deposits and is collected at the feed outlet of the funnel 3.

[0026] 3. The rotary air spray pipes are driven to rotate by the driving motor **8**, the air output from the blast blower **11** enters the transverse pipes **6** and the vertical pipes **7** through the blast pipe **9**, and then passes through the air jet holes in structures of through grooves **14** formed on the pipe walls of the transverse pipes **6** and the vertical pipes **7**. Thus, a reverse blowing air is formed uniformly blowing into the screen drum from a top surface and a side surface of the screen drum **2**. The powder in the screen drum **2** is further atomized. Meanwhile, the powder is prevented from caking on the screen drum **2** to further block the mesh screen; and the coarse powder which fails to pass through the screen drum **2** deposits along with the formed air eddy and enters the funnel **3** to be discharged and collected. Distances from the transverse pipes **6** to the top wall and from the vertical pipes **7** to the sidewall of the screen drum **2** are 25 mm, respectively.

CLAIMS

1. A screening machine having bi-directional airflow for superfine powder,

characterized in that the machine comprises: a casing (1);

a screen drum (2) is disposed in a middle part of an inner cavity of the casing (1); an opening of the screen drum (2) is arranged on a bottom of the screen drum (2) and communicates with an upper opening of a funnel; the funnel (3) is disposed beneath the casing (1);

the inner cavity of the casing (1) communicates with an external induced draft fan (5) via a negative pressure chamber (4) disposed on an upper part of the casing (1);

a rotary air spray pipe comprising a transverse pipe (6) and a vertical pipe (7) is arranged in a space between the screen drum (2) and the casing (1); the rotary air spray pipe is in a shape of a Chinese character “men”; a middle part of the transverse pipe (6) is connected via a transmission with a drive motor (8);

a blast pipe (9) is arranged vertically in a middle part of the screen drum (2); an air outlet of the blast pipe (9) passes through the screen drum (2) and is connected to the middle part of the transverse pipe (6) of the rotary air spray pipe; the air outlet of the blast pipe (9) is in rolling connection with the transverse pipe (6) via a rolling bearing (10);

an air inlet of the blast pipe (9) stretches outside a sidewall of the funnel (3) and communicates to an blast orifice of an external blast blower (11);

a feed pipe (12) is arranged inside the screen drum (2); a feed outlet of the feed pipe (12) is arranged beneath a buffering umbrella (13); and

a feed inlet of the feed pipe (12) stretches outside the sidewall of the

funnel (3).

2. The screening machine of claim 1, wherein

air jet holes of the rotary air spray pipes are formed by axially arranging grooves (14) on pipe walls of the transverse pipe (6) and the vertical pipe (7), respectively; and

an opening of each groove (14) is arranged facing the screen drum (2).

3. The screening machine of claim 1, wherein

air jet holes of the rotary air spray pipes are formed by axially arranging a plurality of strip holes (15) on pipe walls of the transverse pipes (6) and the vertical pipes (7) at intervals, respectively; and

an opening of each of the strip holes (15) is arranged facing the screen drum (2).

4. The screening machine of any one of claims 1-3, wherein

two rotary air spray pipes are provided and arranged in the space between the screen drum (2) and the casing (1); and

the transverse pipes (6) of the two rotary air spray pipes are mutually crossed and perpendicular.