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SPRAY DRYER FOR PROTEIN DRYING.

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The invention discloses a spray dryer for drying protein, which relates to the technical field of protein drying, including a spray host, a charging cylinder and a Mono pump. The input pipe of the Mono pump is connected with the discharge port of the charging cylinder, the output pipe of the Mono pump is connected with the feed port of the spray host, the spray host is connected with a steam heater through a pipe, the steam heater is connected with a blower, the discharge port of the spray host is connected with a cyclone separator, the outlet port of the cyclone separator is connected with a pulse bag dust remover, the pulse bag dust remover is connected with a silencer and an induced draft fan through a pipe, and the invention is connected through an inner wall. The matching setting of the cleaning mechanism and the material grinding mechanism can clean the inner wall of the spray host while the materials are drying, And the cleaned adhesive material blocks are ground into powder without the need for regular shutdown to clean the adhesive wall materials and reprocessing the materials, eliminating the need for this process and improving the efficiency of protein powder drying and processing.

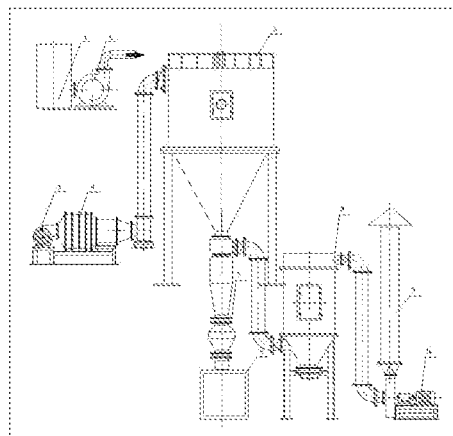


Figure 1

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SPRAY DRYER FOR PROTEIN DRYING

TECHNICAL FIELD

The invention relates to the technical field of protein drying, in particular to a spray dryer for drying protein.

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BACKGROUND

The production of protein powder (such as milk powder, protein powder, peptide powder, etc.) often uses a spray dryer. The basic principle of the spray dryer is that hot air and atomized materials are simultaneously passed into the drying tower, and the atomized materials are quickly evaporated after contacting with the high-temperature hot air, and become dry products in a very short time.

However, the current spray dryer is prone to the phenomenon of material sticking to the wall during the drying process. After the material sticking to the wall, it is impossible to discharge effectively. It needs to be shut down regularly for cleaning. After cleaning, the material needs to be reprocessed, which increases the process and cost of protein powder processing and reduces the production efficiency. Therefore, a spray dryer for protein drying is needed to solve the above problems.

SUMMARY OF THE INVENTION

The purpose of the invention is to provide a spray dryer for drying proteins to solve the problems in the prior art proposed in the above background technology.

To achieve the above objectives, the present invention provides the following technical solution:

A spray dryer for protein drying, including a spray host, a charging cylinder and a Mono pump, the input pipe of the Mono pump is connected with the discharge port of the charging cylinder, the output pipe of the Mono pump is connected with the feed port of the spray host, the spray host is connected with a steam heater through a pipe, the steam heater is connected with a blower, the discharge port of the spray host is

connected with a cyclone separator, the outlet port of the cyclone separator is connected with a pulse bag dust collector, and the pulse bag dust collector is connected with a silencer and an induced draft fan through a pipe;

The outlet of the cyclone separator is connected with an ultrasonic dispersion chamber, and the spray host is equipped with an inner wall cleaning mechanism and a material grinding mechanism, which are used to clean and grind the materials adhered to the inner wall of the spray host.

Preferably, the inner wall cleaning mechanism comprises a driving plate, a scraping impeller and a main gear which are rotationally connected to the inside of the spray host. The driving plate is vertically rotationally connected with a scraping impeller, the edge of the scraping impeller contacts the inner wall of the spray host, the inner wall of the driving plate is installed with a gear ring, the upper end key of the scraping impeller is connected with a main gear which meshes with the gear ring, and the top of the spray host is installed with a drive motor which is used to drive the rotation of the driving plate.

Preferably, the material grinding mechanism is installed on the driving plate and is located on one side of the inner wall cleaning mechanism. The grinding mechanism comprises two grinding rollers rotationally connected to the driving plate, and the upper ends of the two grinding rollers are respectively keyed to a driven gear 1 and a driven gear 2 that mesh with each other. The driven gear 1 meshes with the main gear.

Preferably, the driving plate is equipped with a baffle for the auxiliary scraping material to enter the grinding mechanism.

Preferably, an ultrasonic generator with an ultrasonic frequency range of 15-40KHz is used in the ultrasonic dispersion chamber.

Compared with prior art, the beneficial effects of the present invention are:

1. The invention can clean the inner wall of the spray host while drying materials, and grind the cleaned adhesive material blocks into powder through the coordination of the inner wall cleaning mechanism and the material grinding mechanism. It does not need to shut down regularly to clean the adhesive materials and the reprocessing of

materials, which saves this process and improves the efficiency of protein powder drying.

2. The present invention can complete the granulation process under the cavitation effect of ultrasonic waves by setting up an ultrasonic dispersion chamber, which can increase the product particle size and surface area, enhance its solubility, without the need for adding granulating agents, and save production costs.

DESCRIPTION OF DRAWINGS

Figure 1 is a schematic diagram of the overall structure of the present invention.

Figure 2 is the overall structure diagram of the spray host of the invention.

Figure 3 is the sectional structure diagram of the spray host of the invention.

Figure 4 is a schematic diagram of the upper structure of the drive board of the present invention.

Figure 5 is a schematic diagram of the lower structure of the drive board of the present invention.

In the picture: 1. Material cylinder; 2. Mono pump; 3. Blower; 4. Steam heater; 5. Ultrasonic dispersion chamber; 6. Spray host; 61. Driver board; 62. Scrape off the impeller; 63. Grinding roller; 64. Main gear; 65. Driven gear one; 66. Driven gear II; 67. Ring gear; 68. Drive motor; 69. Baffles; 7. Cyclone separator; 8. Pulse bag filter; 9. Silencer; 10. Induced draft fan.

DETAILED DESCRIPTION OF THE INVENTION

In order to make the technical means, creative features, objectives and effects of the present invention easy to understand, the following will further elaborate on the present invention in conjunction with specific implementation methods.

Please refer to Figures 1-5. The present invention provides the following technical solutions:

A spray dryer for protein drying, including a spray host 6, a charging barrel 1 and a Mono pump 2, the input pipe of the Mono pump 2 is connected with the discharge

port of the charging barrel 1, the output pipe of the Muno pump 2 is connected with the feed port of the spray host 6, the spray host 6 is connected with a steam heater 4 through a pipe, the steam heater 4 is connected with a blower 3, the discharge port of the spray host 6 is connected with a cyclone separator 7, the outlet port of the cyclone separator 7 is connected with a pulse bag dust collector 8, and the pulse bag dust collector 8 is connected with a silencer 9 and an induced draft fan through a pipe 10; Muno pump 2 conveys the materials in barrel 1 to spray host 6, which atomizes the materials into spray host 6, and then enters the interior. The steam heater 4 cooperates with blower 3 to feed high-temperature hot air into spray host 6.

The discharge port of the cyclone separator 7 is connected to an ultrasonic dispersion chamber 5, in which an ultrasonic generator with an ultrasonic frequency range of 15-40KHz is used. When the ultrasonic dispersion chamber 5 processes solid particles, longitudinal waves are generated in the medium due to the cavitation effect of the ultrasonic wave, which alternately compresses and expands the area. The change in pressure will form bubbles in the medium. These bubbles have a larger surface area during the expansion process, increasing the diffusion of gas. During this process, molecules will collide violently, producing shock waves, causing an instantaneous increase in temperature and pressure in the local area, completing the granulation process without the need for adding granulating agents, saving production costs.

The spray host 6 is provided with an inner wall cleaning mechanism and a material grinding mechanism, which are used for cleaning and grinding the materials adhered to the inner wall of the spray host 6; The inner wall cleaning mechanism comprises a driving plate 61, a scraping impeller 62 and a main gear 64 which are rotationally connected to the interior of the spray host 6. The driving plate 61 is vertically rotationally connected with a scraping impeller 62, the edge of the scraping impeller 62 contacts the inner wall of the spray host 6, the inner wall of the driving plate 61 is installed with a gear ring 67, the upper end key of the scraping impeller 62 is connected with a main gear 64 which is meshed with the gear ring 67, and the top of

the spray host 6 is installed with a drive motor 68 which is used to drive the rotation of the driving plate 61; The scraping impeller 62 and grinding roller 63 are arranged in pairs, and the paired scraping impeller 62 and grinding roller 63 are evenly distributed on the circumference of the driving plate 61.

5 The material grinding mechanism is installed on the driving plate 61 and is located on one side of the inner wall cleaning mechanism. The grinding mechanism comprises two grinding rollers 63 that are rotatably connected to the driving plate 61. The upper ends of the two grinding rollers 63 are respectively keyed to a driven gear 65 and a driven gear 266 that mesh with each other. The driven gear 165 meshes with
10 the main gear 64; The grinding mechanism can grind the material scraped off by the inner wall cleaning mechanism into powder, eliminating the need for stopping the cleaning and reprocessing process; The drive plate 61 is equipped with a baffle 69 for auxiliary scraping materials to enter the grinding mechanism. The baffle 69 can prevent the splashing of scraped materials from causing the materials to be unable to
15 be ground.

The working process of the present invention is as follows:

The materials in the charging drum 1 are conveyed to the spray host 6 through the Moono pump 2, and then enter the interior of the spray host 6 after atomization. High temperature hot air is introduced into the spray host 6 through the cooperation of the
20 steam heater 4 and the blower 3. After the atomized materials contact the high temperature hot air, the water evaporates rapidly, realizing the drying of the materials. The dried materials and air flow enter the cyclone separator 7 for separation, and the air flow enters the pulse bag dust remover 8 for filtering again, and is discharged through the silencer 9. The dried materials enter the ultrasonic dispersion room 5 for
25 granulation.

During the drying process, the drive motor 68 is started at the same time, and the drive motor 68 drives the drive plate 61 to rotate, so that the drive plate 61 drives the scraped impeller 62 installed on it to move synchronously. The scraped impeller 62 rotates under the driving effect of the main gear 64 and the ring gear 67, so as to

scrape the materials adhering to the inner wall of the spray host 6, and throw the scraped materials between the two grinding rollers 63. The grinding roller 63 rotates through the driving of the main gear 64, driven gear I 65 and driven gear II 66, so as to grind the scraped materials.

- 5 Although embodiments of the present invention have been shown and described, it can be understood by those skilled in the art that multiple variations, modifications, substitutions, and variations can be made to these embodiments without departing from the principles and spirit of the present invention. The scope of the present invention is limited by the accompanying claims and their equivalents.

CLAIMS

1. A spray dryer for protein drying, which is characterized in that it includes a spray host (6), a charging cylinder (1) and a mono pump (2), the input pipe of the mono pump (2) is connected with the discharge port of the charging cylinder (1), the output pipe of the mono pump (2) is connected with the feed port of the spray host (6), the spray host (6) is connected with a steam heater (4) through a pipe, the steam heater (4) is connected with a blower (3), the discharge port of the spray host (6) is connected with a cyclone separator (7), and the cyclone separator (7) is connected with a pulse bag filter (8), which is connected with a silencer (9) and an induced draft fan (10) through a pipe;

The outlet of the cyclone separator (7) is connected with an ultrasonic dispersion chamber (5), and the spray host (6) is equipped with an inner wall cleaning mechanism and a material grinding mechanism, which are used to clean and grind the materials adhered to the inner wall of the spray host (6).

2. The spray dryer for protein drying according to claim 1, which is characterized in that the inner wall cleaning mechanism comprises a driving plate (61), a scraping impeller (62) and a main gear (64) which are rotationally connected to the inside of the spray host (6), the driving plate (61) is vertically connected with a scraping impeller (62), the edge of the scraping impeller (62) contacts the inner wall of the spray host (6), the inner wall of the driving plate (61) is installed with a gear ring (67), the upper end key of the scraping impeller (62) is connected with a main gear wheel (64) which meshes with the gear ring (67), and the A driving motor (68) for driving the driving plate (61) to rotate is installed on the top of the spray host (6).

3. The spray dryer for protein drying according to claim 2, which is characterized in that the material grinding mechanism is installed on the driving plate (61) and is located on one side of the inner wall cleaning mechanism. The grinding mechanism comprises two grinding rollers (63) rotationally connected to the driving plate (61). The upper ends of the two grinding rollers (63) are respectively keyed with a meshing driven gear I (65) and driven gear II (66), and the driven gear I (65) is meshed with the

main gear (64).

4. The spray dryer for protein drying according to claim 2, which is characterized in that the driving plate (61) is provided with a baffle (69) for auxiliary scraping materials into the grinding mechanism.
- 5 5. The spray dryer for protein drying according to claim 1, which is characterized in that an ultrasonic generator with an ultrasonic frequency range of 15-40KHz is used in the ultrasonic dispersion chamber (5).

REVENDECATIONS

1. Un atomiseur pour sécher les protéines, caractérisé en ce qu'il comprend un pulvérisateur principal (6), une cartouche (1) d'alimentation et une pompe (2) de type muno dont la conduite d'entrée est reliée à l'orifice d'alimentation de la cartouche (1), la conduite de sortie de la pompe (2) de type muno étant reliée à l'orifice d'alimentation du pulvérisateur principal (6) par l'intermédiaire d'une conduite, un réchauffeur de vapeur (4) sur lequel est reliée une soufflante (3), l'orifice d'alimentation du pulvérisateur principal (6) étant relié à un cyclone (7) dont la sortie est reliée à un cyclone (7), et l'embouchure est reliée à un dépoussiéreur de sacs à tissu pulsé (8) relié par une conduite à un silencieux (9) et à un ventilateur d'aspiration (10);

Sur l'orifice de sortie dudit cyclone (7) est connectée une chambre de dispersion ultrasonore (5) à l'intérieur de laquelle sont montés un mécanisme de nettoyage des parois internes et un mécanisme de broyage des matériaux et de nettoyage et de broyage des matériaux collés sur les parois internes du pulvérisateur (6).

2. Sécheur par pulvérisation pour le séchage des protéines selon la revendication 1, caractérisé en ce que le mécanisme de nettoyage de paroi interne comprend une plaque d'entraînement (61) solidaire en rotation de l'intérieur d'un maître pulvérisateur (6), une roue d'essuyage (62) sur laquelle est solidaire en rotation verticalement une roue d'essuyage (62) dont le bord est en contact avec la paroi interne du maître pulvérisateur (6), et une roue dentée principale (64) sur laquelle est solidaire en rotation une couronne dentée (67) dont l'extrémité supérieure est clavetée une roue dentée principale (64) engrenant avec la Couronne dentée (67), et ledit maître de pulvérisation (6) est surmonté d'un moteur d'entraînement (68) destiné à entraîner en rotation le plateau d'entraînement (61).

3. Sécheur par pulvérisation pour le séchage des protéines selon la revendication 2, caractérisé en ce que le mécanisme de broyage de la matière est monté sur une plaque d'entraînement (61) et en position latérale du mécanisme de nettoyage de la paroi interne, le mécanisme de broyage comprenant la rotation de deux rouleaux abrasifs (63) solidaires de la plaque d'entraînement (61), les extrémités supérieures des deux rouleaux abrasifs (63) étant clavetées respectivement d'un pignon mené un (65) et d'un pignon mené deux (66) engrenant l'un avec l'autre, le pignon mené un (65) engrenant avec le pignon principal (64).

4. Sécheur par pulvérisation pour le séchage des protéines selon la revendication 2, caractérisé en ce que la plaque d'entraînement (61) est munie d'un volet (69) d'admission de la matière assistée par raclage dans le mécanisme de broyage.

5. Sécheur par pulvérisation pour le séchage des protéines selon la revendication 1, caractérisé en ce que l'on utilise dans la Chambre de dispersion par ultrasons (5) un générateur d'ultrasons ayant une fréquence ultrasonore comprise entre 15 et 40 kHz.

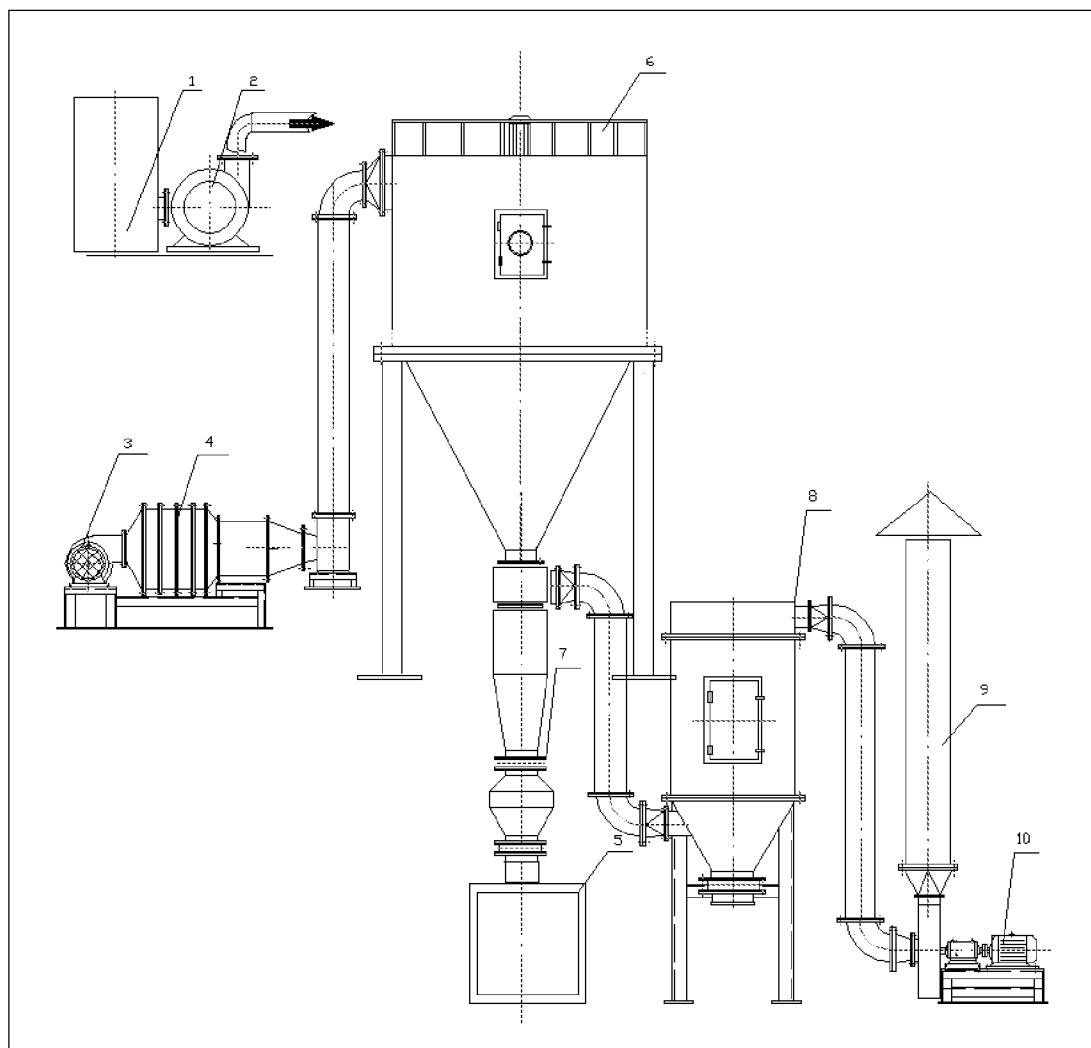


Figure 1

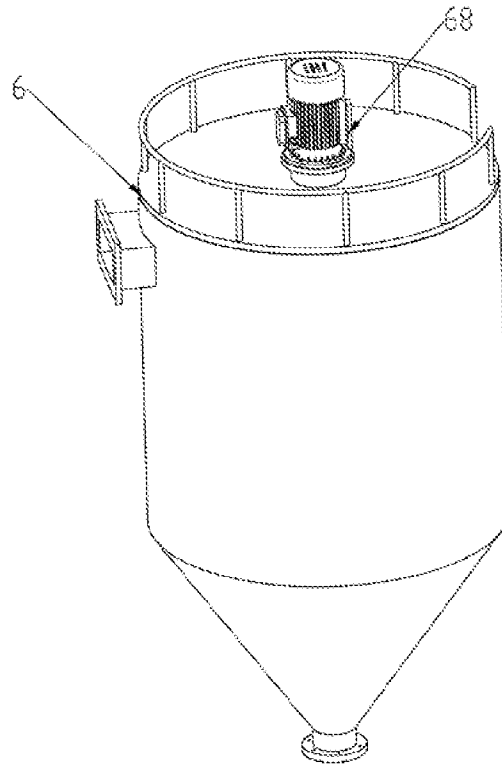


Figure 2

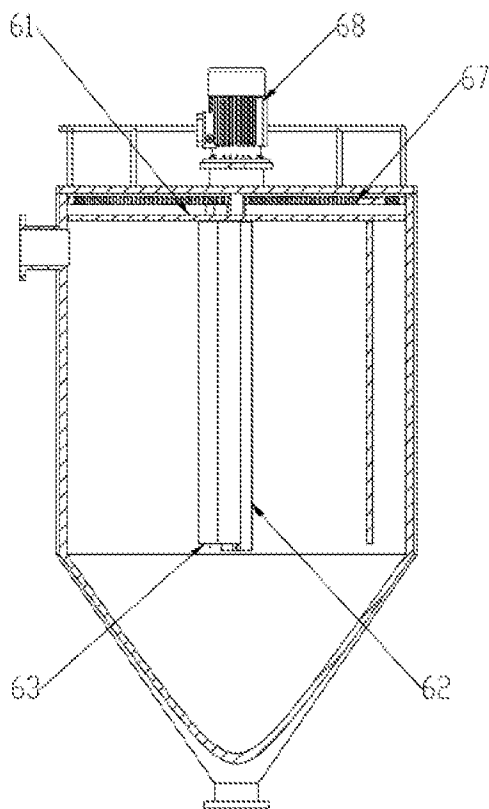


Figure 3

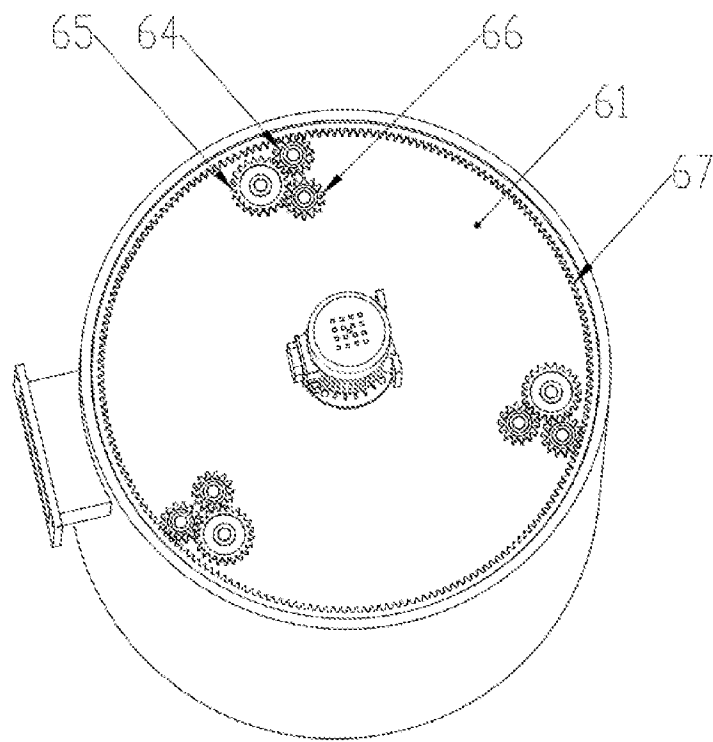


Figure 4

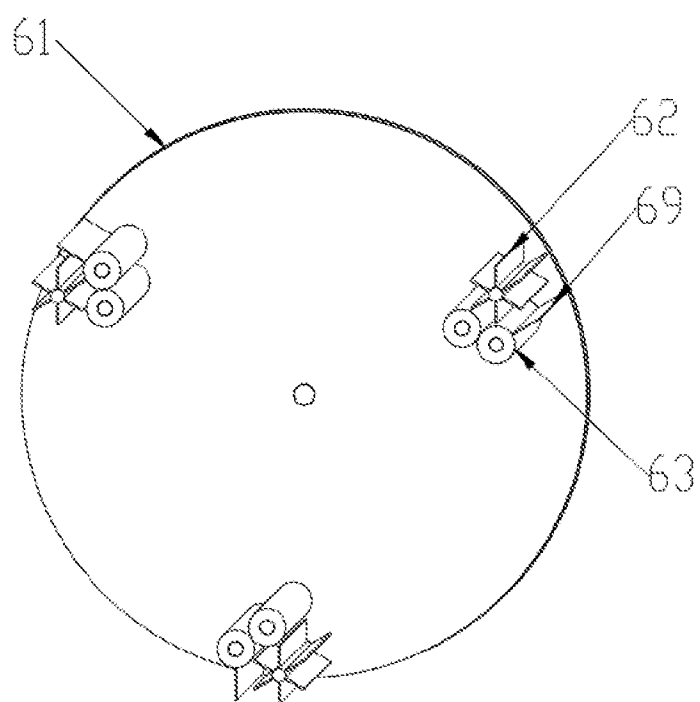


Figure 5