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(54) **SINTERING FURNACE HAVING DUST CLEANING AND CONVEYING FUNCTION**

(57) The present invention discloses a sintering furnace with dust cleaning and transporting function, which includes a sintering chamber. A plurality of first heating rollers and a plurality of second heating rollers are provided within the sintering chamber. A lower side of the sintering chamber is provided with a middle housing fixedly provided with a first inclined plate and a second inclined plate. A fan is fixedly mounted on the middle housing, a mouthpiece tube is connected to the fan, an air outlet is provided on the mouthpiece tube, and the air outlet blows away the dust on the first inclined plate and the second inclined plate. A bottom housing is fixedly mounted below the middle housing, and a plurality of first cleaning blocks and a plurality of second cleaning blocks are mounted in the bottom housing and are respectively located on either side of the second inclined plate. According to the sintering furnace with dust cleaning and transporting function of the present invention, the sintering environment in the sintering furnace is improved, the cleaning is facilitated, and the service life of the sintering furnace is extended.

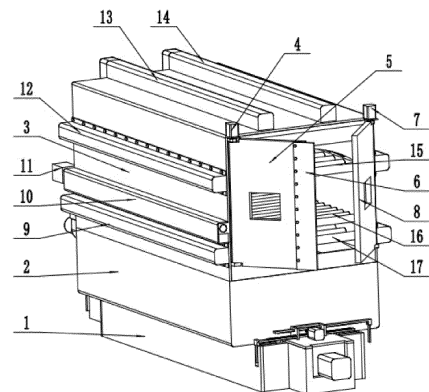


Fig. 1

Description

[0001] The present application claims priority to Chinese patent application No. CN 202211507912.9, entitled "SINTERING FURNACE WITH DUST CLEANING AND TRANSPORTING FUNCTION", filed on November 29, 2022, by the China Patent Office, which is incorporated herein by reference in its entirety.

Technical Field

[0002] The present invention relates to the technical field of sintering furnaces, in particular to a sintering furnace with dust cleaning and transporting function.

Background Art

[0003] The sintering furnace is a special equipment for obtaining the required physical, mechanical properties and microstructure of powder compact through sintering. The sintering furnace is used for drying the slurry on the silicon wafer, removing organic components from the slurry, and completing the sintering of the aluminium back field and the grid line. The sintering furnace produces a large amount of smoke and dust when smelting metals, which is harmful to human health, and the long-term use of the sintering network inside the sintering furnace is not conducive to cleaning. Chinese utility model patent CN 213778685U discloses a cleaning device for an SPS discharge plasma sintering furnace, which includes a cleaning chamber. A first electric motor is fixedly connected to one side of the inner wall of the cleaning chamber, and a first gear is fixedly inserted on an output shaft of the first electric motor. A first clamping column is fixedly connected to the first electric motor output shaft, and a connecting rod is connected to the first clamping column in a clamping manner. The sintering network penetrates through an outer surface of the connecting rod. The output shaft of the first electric motor of the utility model drives the sintering network to rotate, at the same time, the output shaft of the first electric motor drives the first gear to rotate, the first gear drives the second gear to rotate, and the second gear drives the rotating shaft to rotate. The brush on the surface of the rotating shaft cleans the dust on the surface of the sintering network, and at the same time, the second electric motor operates to rotate a fan-shaped rotating wheel driving the sliding rod to move left and right. A plurality of high-pressure jet nozzles are used to jet air to clean the sintering network, and at the same time, a scraper is used to scrape the sintering network, so that the sintering network is effectively cleaned.

[0004] However, in the prior art, the dust can only be collected in a fixed position, and the collected dust cannot be transported, resulting that the collected dust still continues to float in the furnace, and can only be removed manually after disassembly, which would seriously increase the maintenance cost, so that a device that is

capable of automatically transporting the dust out of the furnace is required.

Summary of the Invention

[0005] In view of the above technical problem, the present invention discloses a sintering furnace with dust cleaning and transporting function, which includes a sintering chamber. A plurality of first heating rollers and a plurality of second heating rollers are provided within the sintering chamber. A carrier roller is provided between the first heating roller and the second heating roller, a lower side of the sintering chamber is provided with a middle housing fixedly provided with a first inclined plate and a second inclined plate. An expansion joint is provided between the first inclined plate and the second inclined plate, a fan is fixedly provided on the middle housing, the fan is connected to a mouthpiece tube, an air outlet is provided on the mouthpiece tube to blow away dust on the first inclined plate and the second inclined plate, a bottom housing is fixedly provided below the middle housing, a sixth electric motor is fixedly provided on the bottom housing, a spiral roller is fixedly provided on a rotating shaft of the sixth electric motor, the spiral roller is located at the bottom end of the first inclined plate and the second inclined plate, an dust outlet is fixedly provided at one end of the bottom housing, a closing plate is fixedly provided on the dust outlet, the closing plate is rotatably connected to the spiral roller, and there is an opening between the dust outlet and the closing plate for dust falling.

[0006] In an embodiment, a plurality of first cleaning blocks and a plurality of second cleaning blocks are mounted in the bottom housing at either side of the second inclined plate, respectively. A compression spring is provided in the bottom housing to urge the first cleaning block and the second cleaning block toward the sixth electric motor, and a hole is provided in the first cleaning block. A short rod is fixedly mounted on the second cleaning block, and a small spring is sleeved on the short rod. When the hole of the first cleaning block is engaged with the short rod, the combination of the first cleaning block and the second cleaning block abuts a lower end of the second inclined plate and slides within the second inclined plate. A threaded hole is provided on the first cleaning block and the second cleaning block, and the threaded hole cooperates with the spiral roller; a first pushing assembly and a second pushing assembly are provided on the bottom housing, and the first pushing assembly pushes the first cleaning block and the second cleaning block from either side of the second inclined plate to the middle of the second inclined plate. The second pushing assembly pushes the first cleaning block and the second cleaning block into the spiral part of the spiral roller, and the spiral roller rotates to slide the first cleaning block and the second cleaning block in the second inclined plate.

[0007] In an embodiment, the second pushing assem-

bly includes a rectangular plate and a wedge plate, both of which are slidably mounted in the bottom housing, and a second spring mounted between the rectangular plate and the wedge plate. A first spring is mounted between the rectangular plate and the bottom housing, a sliding rod is fixedly mounted on the rectangular plate, and a blocking plate is rotatably mounted on either side of the bottom housing. In a natural state, the sliding rod bears against the blocking plate which blocks a movement path when the first cleaning block and the second cleaning block are engaged, and when the first pushing assembly drives the first cleaning block and the second cleaning block to be engaged, the first cleaning block and the second cleaning block first contact two inclined surfaces of the wedge plate, and push the wedge plate in a direction close to the sixth electric motor.

[0008] In an embodiment, the first pushing assembly includes a sliding support on which the first rack and the second rack are slidably mounted, and a fifth electric motor is fixedly mounted on the bottom housing. A pinion is fixedly mounted on the rotating shaft of the fifth electric motor, the upper and lower sides of the pinion are respectively engaged with the first rack and the second rack, a first rotating rod is hinged to the second rack, the hinge point is higher than the first cleaning block, a second rotating rod is hinged to the first rack, and the hinge point is higher than the second cleaning block. The first rotating rod can only be rotated in a direction close to the second rotating rod and the second rotating rod can only be rotated in a direction close to the first rotating rod.

[0009] In an embodiment, a ramp plate is provided in the bottom housing between the second pushing assembly and the threaded portion of the spiral roller, and a small ramp is provided on the ramp plate. As the first cleaning block and the second cleaning block approach the threaded portion of the spiral roll, the first cleaning block and the second cleaning block approach each other, driven by the ramp.

[0010] In an embodiment, an upper side of the sintering chamber is provided with a first exchange chamber and a second exchange chamber, wherein the first exchange chamber is provided with a heating rod, and the sintering chamber is provided with a first pipeline. The air enters the sintering chamber through the first pipeline and the first exchange chamber, a second pipeline is provided on the sintering chamber, a fan is provided on the second pipeline, and the dust in the sintering chamber is discharged through the second exchange chamber and the second pipeline.

[0011] In an embodiment, a fourth electric motor is fixedly mounted on the closing plate. A first gear is fixedly mounted on a rotating shaft of the fourth electric motor, and a second gear is meshed on one side of the first gear. A second gear is rotatably mounted on the closing plate, the second gear is fixedly mounted on the second gear, and a second baffle and a first baffle are slidably mounted on the closing plate. The first baffle and the second baffle are respectively engaged with the two ends

of a bidirectional lead screw, the second baffle is located at a lower end of the second pipeline, and the first baffle is located at a lower end of the first pipeline for plugging.

[0012] In an embodiment, a plurality of carrier rollers are rotatably mounted in the sintering chamber. A worm wheel is fixedly mounted on one side of the carrier roller, a worm is rotatably mounted on one side of the sintering chamber, and the worm is engaged with the worm wheel. A third electric motor is fixedly mounted on the sintering chamber, and a rotation shaft of the third electric motor is fixedly connected to the worm.

[0013] The advantageous effects of the present invention compared to the prior art are: (1) the mouthpiece tube provided in the present invention can blow the dust on the second inclined plate into the bottom of the second inclined plate and discharge the dust through the spiral roller, improving the sintering environment in the sintering furnace, facilitating the cleaning and extending the service life of the device. (2) The present invention can clean the inside of the first inclined plate and the second inclined plate by the first cleaning block and the second cleaning block, clean the dust at a position where the spiral roll cannot be cleaned, and clean the spiral roll itself. (3) The second pushing assembly provided in the present invention can automatically feed the pushed-in first cleaning block and the second cleaning block into the second inclined plate, without additional operations, with a high degree of automation and simple operation; (4) the first pipeline and the second pipeline provided in the present invention can treat the dust floating in the sintering chamber, further improve the sintering environment, and the incoming air is hot air during the air exchange, reducing the disruption of the heat balance in the sintering chamber.

Brief Description of the Drawings

[0014]

FIG. 1 is a schematic view showing the overall structure of a sintering furnace according to the present invention.

FIG. 2 is a schematic view showing the internal structure of the sintering chamber according to the present invention.

FIG. 3 is a schematic view showing the external structure of the sintering chamber according to the present invention.

FIG. 4 is an enlarged view of portion E in FIG. 3.

FIG. 5 is a schematic view showing a second pushing assembly according to the present invention.

FIG. 6 is an enlarged view of portion A in FIG. 5.

FIG. 7 is a schematic view 2 showing a second pushing assembly according to the present invention.

FIG. 8 is an enlarged view of portion B in FIG. 7.

FIG. 9 is a schematic view showing the position of the cleaning block and inclined plate according to the present invention.

FIG. 10 is a schematic view of the cleaning block according to the present invention.

FIG. 11 is a schematic view showing an inner structure of a middle housing according to the present invention.

FIG. 12 is an enlarged view of portion C in FIG. 11.

FIG. 13 is a schematic view showing another overall configuration according to the present invention.

FIG. 14 is a schematic view showing the location of the cleaning block according to the present invention in the bottom housing.

FIG. 15 is a schematic view showing the structure of a first pushing assembly according to the present invention.

FIG. 16 is an enlarged view of portion D in FIG. 15.

Detailed Description of the Invention

[0015] The embodiments of the present invention will be further described with reference to the accompanying drawings. The drawings are for illustrative purposes only and are shown in schematic form rather than in physical form and are not to be construed as limiting the invention. In order to better illustrate embodiments of the present invention, certain features of the drawings may be omitted, enlarged or reduced in size and may not represent actual product dimensions. It will be appreciated by a person skilled in the art that certain well-known structures and descriptions thereof may be omitted from the figures.

[0016] According to an embodiment of the present invention, a sintering furnace with dust cleaning and transporting function includes a bottom housing 1 on which a middle housing 2 is fixedly mounted. The middle housing 2 is fixedly provided with a sintering chamber 3. A ventilation duct is provided on the sintering chamber 3, so that the floating dust in the sintering chamber 3 can be discharged, and the temperature in the original sintering chamber 3 can be adjusted by replenishing air. A first inclined plate 27 and a second inclined plate 28 are provided in the middle housing 2, and dust falling on the first inclined plate 27 and the second inclined plate 28 is blown down by a mouthpiece tube 26, and is finally discharged by a spiral roller 49. The sintering furnace according to

the present invention also includes a first cleaning block 53 and a second cleaning block 54 for cleaning the spiral roller 49, the second inclined plate 28 and the first inclined plate 27 by feeding the first cleaning block 53 and the second cleaning block 54 into the second inclined plate 28.

[0017] A first vent hole 19 and a second vent hole 20 are provided on the sintering chamber 3. A second pipeline 14 is provided at an upper side of the first vent hole 19, and a first pipeline 13 is provided at an upper side of the second vent hole 20. One side of the bottom housing 1 is fixedly provided with a dust outlet 42, and a closing plate 43 is fixedly provided on the dust outlet 42. A fourth electric motor 29 is fixedly mounted on the closing plate 43, and a first gear 30 is fixedly mounted on a rotating shaft of the fourth electric motor 29. One side of the first gear 30 is meshed with a second gear 31 rotatably mounted on the closing plate 43. A second baffle 34 and a first baffle 33 are slidably mounted on the closing plate 43, and a bidirectional lead screw 32 is fixedly mounted on the second gear 31, and two ends of the bidirectional lead screw 32 respectively engage with the first baffle 33 and the second baffle 34. A second baffle 34 is located at a lower end of the second pipeline 14 and a first baffle 33 is located at a lower end of the first pipeline 13. A first exchange chamber 21 and a second exchange chamber 22 are provided at an upper side of the sintering chamber 3. A heating rod 24 is provided in the first exchange chamber 21, a first pipeline 13 is provided on the sintering chamber 3, and air enters the sintering chamber 3 through the first pipeline 13 and the first exchange chamber 21. A second pipeline 14 is provided on the sintering chamber 3, and a fan is provided on the second pipeline 14. The dust in the sintering chamber 3 is discharged through the second exchange chamber 22 and the second pipeline 14, and the sliding of the first baffle 33 and the second baffle 34 is controlled by the fourth electric motor 29, and the first baffle 33 and the second baffle 34 slide when air exchange and dust discharge are required, and the first pipeline 13 and the second pipeline 14 are no longer blocked.

[0018] The sintering chamber 3 is provided with a plurality of first heating rollers 15 and a plurality of second heating rollers 17. Either side of the sintering chamber 3 are bolted with a third protective housing 12 for sealing either end of the first heating roller 15. Either side of the sintering chamber 3 is fixedly mounted with a first protective housing 9 by bolts, and the first protective housing 9 is used for sealing either end of the second heating roller 17. A plurality of carrier rollers 16 are rotatably mounted between the first heating roller 15 and the second heating roller 17, a worm wheel 23 is fixedly mounted on one side of each carrier roller 16, and a worm 18 is rotatably mounted on the sintering chamber 3. A third electric motor 11 is fixedly mounted on the sintering chamber 3, the third electric motor 11 drives the worm 18 to rotate, a second protective housing 10 is fixedly mounted on the sintering chamber 3, the second protec-

tive housing 10 is used for sealing the worm 18 and the worm wheel 23, the article to be sintered is placed on the carrier roller 16, and the article can be automatically transported into the sintering chamber 3 by activating the third electric motor 11.

[0019] The sintering chamber 3 is rotatably provided with a first door plate 5 and a second door plate 8. The first door plate 5 is driven by a first electric motor 4, and the second door plate 8 is driven by a second electric motor 7. A vertical plate 6 is fixedly mounted on the first door panel 5, the second door panel 8 is first closed and then the first door panel 5 is closed, the vertical plate 6 buckles on the second door panel 8 to increase the sealing effect, and observation windows are provided on both the first door panel 5 and the second door panel 8.

[0020] A first inclined plate 27 and a second inclined plate 28 are fixedly mounted in the middle housing 2, an expansion joint is mounted between the first inclined plate 27 and the second inclined plate 28, and a fan 25 is fixedly mounted on the middle housing 2. A mouthpiece tube 26 is connected to the fan 25, an air outlet is provided on the mouthpiece tube 26, the air outlet blows away the dust on the first inclined plate 27 and the second inclined plate 28, a sixth electric motor 44 is fixedly mounted on the bottom housing 1, and a spiral roller 49 is fixedly mounted on rotating shaft of the sixth electric motor 44. The spiral roller 49 is located at the bottom ends of the first inclined plate 27 and the second inclined plate 28; one end of the bottom housing 1 is fixedly provided with an dust outlet 42; a closing plate 43 is fixedly provided on the dust outlet 42; the closing plate 43 is rotatably connected to the spiral roller 49; an opening between the dust outlet 42 and the closing plate 43 is used for dust falling; and when there is enough dust at the bottom of the first inclined plate 27 and the second inclined plate 28, a sixth electric motor 44 is started to drive the spiral roller 49 to push out the dust.

[0021] A plurality of first cleaning blocks 53 and a plurality of second cleaning blocks 54 are mounted in the bottom housing 1 and are respectively located on either side of the second inclined plate 28, and a compression spring is provided in the bottom housing 1 to push the first cleaning blocks 53 and the second cleaning blocks 54 in a direction of the sixth electric motor 44. A hole is provided in the first cleaning block 53, a short rod 55 is fixedly mounted on the second cleaning block 54, a small spring 56 is sleeved on the short rod 55, and when the hole of the first cleaning block 53 is engaged with the short rod 55, the combination of the first cleaning block 53 and the second cleaning block 54 abuts with the lower end of the second inclined plate 28 and slides in the second inclined plate 28. The first cleaning block 53 and the second cleaning block 54 are provided with threaded holes which cooperate with the spiral roller 49. The bottom housing 1 is provided with a first pushing assembly and a second pushing assembly, and the first pushing assembly pushes the first cleaning block 53 and the second cleaning block 54 from either side of the second in-

clined plate 28 to the middle of the second inclined plate 28, so that the first cleaning block 53 and the second cleaning block 54 can slide along the non-spiral position of the spiral roller 49. The second pushing assembly pushes the first cleaning block 53 and the second cleaning block 54 into the spiral position of the spiral roller 49, and the spiral roller 49 rotates and drives the first cleaning block 53 and the second cleaning block 54 to slide in the second inclined plate 28 as if the screw nut is fitted to clean the dust stuck in the second inclined plate 28 and the first inclined plate 27. The first pushing assembly can push the first cleaning block 53 and the second cleaning block 54 toward each other, and the second pushing assembly can push the first cleaning block 53 and the second cleaning block 54 against the spiral position on the spiral roller 49.

[0022] In this embodiment, the second push assembly includes a rectangular plate 46 and a wedge plate 48, both of which are slidably mounted in the bottom housing 1, between which a second spring 47 is mounted. A first spring 45 is provided between the rectangular plate 46 and the bottom housing 1, a sliding rod 50 is fixedly provided on the rectangular plate 46, a blocking plate 51 is rotatably provided on either side of the bottom housing 1, and in a natural state, the sliding rod 50 abuts against the blocking plate 51. The blocking plate 51 blocks the movement path of the first cleaning block 53 and the second cleaning block 54 when they are engaged, and when the first pushing assembly drives the first cleaning block 53 and the second cleaning block 54 to be engaged, the first cleaning block 53 and the second cleaning block 54 first contact two inclined surfaces of the wedge plate 48, and push the wedge plate 48 close to the sixth electric motor 44. When the first cleaning block 53 and the second cleaning block 54 are pushed close to each other, the first cleaning block 53 and the second cleaning block 54 are pushed against a spiral part of the spiral roller 49 by the wedge plate 48 under the action of the spring, and when the spiral roller 49 rotates, cleaning is started as if the nut is twisted into the bolt.

[0023] The first pushing assembly includes a sliding frame 36. A first rack 38 and a second rack 39 are slidably mounted on the sliding frame 36, and a fifth electric motor 35 is fixedly mounted on the bottom housing 1. A pinion 37 is fixedly mounted on the rotating shaft of the fifth electric motor 35, and the upper and lower sides of the pinion 37 are respectively meshed with a first rack 38 and a second rack 39. The first rotating rod 40 is hinged to the second rack 39 at a higher point than the first cleaning block 53, and a second rotating rod 41 is hinged to the first rack 38 at a higher point than the second cleaning block 54. The first rotating rod 40 can be rotated only in a direction close to the second rotating rod 41, and the second rotating rod 41 can be rotated only in a direction that approaches (is close to) the first rotating rod 40, so that the first rotating rod 40 and the second rotating rod 41 are not blocked by the first cleaning block 53 and the second cleaning block 54 when retracted.

[0024] An ramp plate 52 is provided in the bottom housing 1 and is located between the second pushing assembly and the threaded portion of the spiral roller 49, a small ramp (inclined surface) is provided on the ramp plate 52, and when the first cleaning block 53 and the second cleaning block 54 approach the threaded portion of the spiral roller 49, the first cleaning block 53 and the second cleaning block 54 approach each other, driven by the ramp.

[0025] Working principle: the parts to be sintered are placed on the carrier roller 16, and the third electric motor 11 is started; the third electric motor 11 drives the worm 18 to rotate; the worm 18 drives the worm wheel 23 to rotate; the worm wheel 23 drives the carrier roller 16 to rotate; and the parts placed on the carrier roller 16 are automatically transported to the inside of the sintering chamber 3. After the placement, the second electric motor 7 is started, and the second electric motor 7 drives the second door panel 8 to close, then the first electric motor 4 drives the first door panel 5 to close. The first heating roller 15 and the second heating roller 17 are started to perform sintering, and this process can be observed through windows on the first door plate 5 and the second door plate 8; if a large amount of dust floats in the sintering chamber 3, a fourth electric motor 29 is started; the fourth electric motor 29 drives a first gear 30; the first gear 30 rotates to drive a second gear 31; the second gear 31 drives a first baffle 33 and a second baffle 34 to be close to each other via a bidirectional lead screw 32. Meanwhile, an opening on the lower side of the first pipeline 13 and the second pipeline 14 is exposed; and a fan is started; and the fan extracts the dust in the sintering chamber 3 via the second pipeline 14 and the second exchange chamber 22. Meanwhile a gas is required to be replenished in the sintering chamber 3, and air enters the first exchange chamber 21 through the first pipeline 13. The heating rods 24 in the first exchange chamber 21 preliminarily heat the air, which minimally affects the thermal balance in the sintering chamber 3 when replenish air thereto.

[0026] During the sintering process, the fan 25 is started, the opening of the fan 25 gently blows air against the inclined surfaces of the first inclined plate 27 and the second inclined plate 28 to blow away the dust on the bottom of the first inclined plate 27 and the second inclined plate 28, and when the dust accumulates on the bottom, the sixth electric motor 44 is started to drive the spiral roller 49 to rotate. The spiral roller 49 pushes the accumulated dust down to the opening of the dust outlet 42 and the closing plate 43, and since the spiral structure of the spiral roller 49 has a smaller diameter than the bottom of the first inclined plate 27 and the second inclined plate 28, there is a dead angle of transportation. Therefore, the fifth electric motor 35 is started at this time, and the fifth electric motor 35 rotates the pinion 37, and the pinion 37 moves the first rack 38 and the second rack 39, so that the first rotating rod 40 and the second rotating rod 41 are close to each other. The first rotating rod 40

and the second rotating rod 41 drive the first cleaning block 53 and the second cleaning block 54 to approach each other, and at this time, the first cleaning block 53 and the second cleaning block 54 drive the blocking plate 51 to rotate, the blocking plate 51 drives the sliding rod 50 to slide, and the sliding rod 50 drives the rectangular plate 46 to move in a direction of approaching the sixth electric motor 44. The short rod 55 is first inserted into the hole of the first cleaning block 53, after which the first cleaning block 53 and the second cleaning block 54 respectively contact the two inclined surfaces of the wedge plate 48 and push the wedge plate 48 to slide in a direction of the sixth electric motor 44. At this time, the rectangular plate 46 is pushed closer to the sixth electric motor 44 again by the second spring 47, and the sliding rod 50 is disengaged from the blocking plate 51. Then, after the first cleaning block 53 and the second cleaning block 54 are brought into contact, the fifth electric motor 35 is reversely started so that the first rotating rod 40 and the second rotating rod 41 are moved away from each other while the first rotating rod 40 and the second rotating rod 41 are rotated by being blocked by the first cleaning block 53. Finally, the first rotating rod 40 and the second rotating rod 41 return to either side of the bottom housing 1, the wedge plate 48 pushes the first cleaning block 53 and the second cleaning block 54 to slide in a direction away from the sixth electric motor 44 under the action of the first spring 45 and the second spring 47, and the first cleaning block 53 and the second cleaning block 54 tightly abut with each other under the action of the inclined plate 52, the first cleaning block 53 and the second cleaning block 54 are disengaged from the blocking plate 51 during the movement of the first cleaning block 53 and the second cleaning block 54, and the sliding rod 50 again contacts the blocking plate 51 under the action of the contraction of the first spring 45 and the second spring 47 to push the blocking plate 51 back to the original position for sealing. At this time, the first cleaning block 53 and the second cleaning block 54 abut against the spiral part of the spiral roller 49, and when the spiral roller 49 rotates, the first cleaning block 53 and the second cleaning block 54 are driven to slide in the second inclined plate 28 and the first inclined plate 27 by cooperating with the threaded hole, and finally the dust is completely scraped out. When moving to the opening of the dust outlet 42 and the closing plate 43, a small spring 56 springs the first cleaning block 53 and the second cleaning block 54 apart.

[0027] The foregoing descriptions of specific exemplary embodiments of the present invention have been presented for purposes of illustration and example. It is not intended to limit the invention to the precise form disclosed, and obviously many modifications and variations are possible in light of the above teaching. The exemplary embodiments were chosen and described in order to explain the specific principles of the invention and its practical application to enable a person skilled in the art to make and use various exemplary embodiments of the

invention and various alternatives and modifications. It is intended that the scope of the invention be defined by the claims and their equivalents.

Claims

1. A sintering furnace with dust cleaning and transporting function, **characterized in that** it comprises:

a sintering chamber (3), wherein a plurality of first heating rollers (15) and a plurality of second heating rollers (17) are provided in the sintering chamber (3), and a carrier roller (16) is provided between the first heating rollers (15) and the second heating rollers (17);

a middle housing (2) provided on a lower side of the sintering chamber (3), wherein a first inclined plate (27) and a second inclined plate (28) are fixedly mounted in the middle housing (2), a fan (25) is fixedly mounted on the middle housing (2) and is used for blowing away dusts on the first inclined plate (27) and the second inclined plate (28);

a bottom housing (1) fixed to the middle housing (2), wherein a sixth electric motor (44) is fixedly mounted on the bottom housing (1), a spiral roller (49) is fixedly mounted on a rotating shaft of the sixth electric motor (44), the spiral roller (49) is located at the bottom ends of the first inclined plate (27) and second inclined plate (28), an dust outlet (42) is fixedly mounted on one end of the bottom housing (1), a closing plate (43) is fixedly mounted on the dust outlet (42) and is rotatably connected to the spiral roller (49), and an opening is provided between the dust outlet (42) and the closing plate (43) for dust falling;

a plurality of first cleaning blocks (53) and a plurality of second cleaning blocks (54) provided in the housing (1) and located at either side of the second inclined plate (28) respectively, wherein a compression spring is provided in the bottom housing (1) for pushing the first cleaning blocks (53) and the second cleaning blocks (54) in a direction of the sixth electric motor (44), a hole is provided in the first cleaning blocks (53), a short rod (55) is fixedly mounted on the second cleaning blocks (54), a small spring (56) is sleeved on the short rod (55), and when the hole of the first cleaning blocks (53) is engaged with the short rod (55), the combination of the first cleaning block (53) and the second cleaning block (54) is adhered to a lower end of the second inclined plate (28) and slides in the second inclined plate (28), a threaded hole is provided on the first cleaning block (53) and the second cleaning block (54) to be engaged with the spiral roller (49); and

a first pushing assembly and a second pushing assembly provided on the bottom housing (1), wherein the first pushing assembly is designed to push the first cleaning block (53) and the second cleaning block (54) from either side of the second inclined plate (28) to the middle of the second inclined plate (28), and the second pushing assembly is designed to push the first cleaning block (53) and the second cleaning block (54) into the spiral part of the spiral roller (49), and the spiral roller (49) rotates to drive the first cleaning block (53) and the second cleaning block (54) to slide in the second inclined plate (28).

2. The sintering furnace with dust cleaning and transporting function according to claim 1, **characterized in that** the second pushing assembly comprises:

a rectangular plate (46) and a wedge plate (48) both slidably mounted in the bottom housing (1);
a second spring (47) mounted between the rectangular plate (46) and the wedge plate (48);
a first spring (45) mounted between the rectangular plate (46) and the bottom housing (1);
a sliding rod (50) fixedly mounted on the rectangular plate (46); and
blocking plates (51) rotatably mounted on both sides of the bottom housing (1);
wherein in a natural state, the sliding rod (50) bears against the blocking plate (51); the blocking plate (51) blocks the movement path of the first cleaning block (53) and the second cleaning block (54) when they are engaged; and
when the first pushing assembly drives the first cleaning block (53) and the second cleaning block (54) to be engaged, the first cleaning block (53) and the second cleaning block (54) first contact two inclined surfaces of the wedge plate (48), and push the wedge plate (48) in a direction close to the sixth electric motor (44).

3. The sintering furnace with dust cleaning and transporting function according to claim 2, **characterized in that** the first pushing assembly comprises:

a sliding frame (36);
a first rack (38) and a second rack (39) slidably mounted on the sliding frame (36);
a fifth electric motor (35) fixedly mounted on the bottom housing (1),
a pinion (37) is fixedly mounted on the rotating shaft of the fifth electric motor (35), the upper and lower sides of the which are respectively meshed with the first rack (38) and the second rack (39);
a first rotating rod (40) hinged to the second rack (39) at a hinge point higher than a first cleaning

block (53); and

a second rotating rod (41) hinged to the first rack (38) at a hinge point higher than the second cleaning block (54), the first rotating rod (40) can rotate only in the direction close to the second rotating rod (41), and the second rotating rod (41) can rotate only in a direction close to the first rotating rod (40).

side of the carrier roller (16); a worm (18) is rotatably mounted on one side of the sintering chamber (3), the worm (18) meshes with the worm wheel (23); a third electric motor (11) is fixedly mounted on the sintering chamber (3), and a rotating shaft of the third electric motor (11) is fixedly connected to the worm (18).

4. The sintering furnace with dust cleaning and transporting function according to claim 3, **characterized in that** an ramp plate (52) is provided in the bottom housing (1) and is located between the second pushing assembly and the threaded portion of the spiral roller (49), wherein the ramp plate (52) is provided with a small ramp and when the first cleaning block (53) and the second cleaning block (54) approach the threaded portion of the spiral roller (49), the first cleaning block (53) and the second cleaning block (54) approach each other, driven by the ramp.
5. The sintering furnace with dust cleaning and transporting function according to claim 1, **characterized in that** a first exchange chamber (21) and a second exchange chamber (22) are provided on an upper side of the sintering chamber (3), a heating rod (24) is provided in the first exchange chamber (21), a first pipeline (13) is provided on the sintering chamber (3), air passes through the first pipeline (13) and the first exchange chamber (21) into the sintering chamber (3), a second pipeline (14) is provided on the sintering chamber (3), a fan is provided on the second pipeline (14), and the dust in the sintering chamber (3) passes through the second exchange chamber (22) and the second pipeline (14) to be discharged.
6. The sintering furnace with dust cleaning and transporting function according to claim 5, **characterized in that** a fourth electric motor (29) is fixedly mounted on the closing plate (43), a first gear (30) is fixedly mounted on a rotating shaft of the fourth electric motor (29), one side of the first gear (30) is meshed with a second gear (31) rotatably mounted on the closing plate (43), a bidirectional lead screw (32) is fixedly mounted on the second gear (31), a second baffle (34) and a first baffle (33) are slidably mounted on the closing plate (43) and are respectively meshed with two ends of the bidirectional lead screw (32), the second baffle (34) is located at the lower end of the second pipeline (14) and the first baffle (33) is located at the lower end of the first pipeline (13).
7. The sintering furnace with dust cleaning and transporting function according to claim 6, **characterized in that** a plurality of carrier rollers (16) are provided and are all rotatably mounted in the sintering chamber (3); a worm wheel (23) is fixedly mounted on one

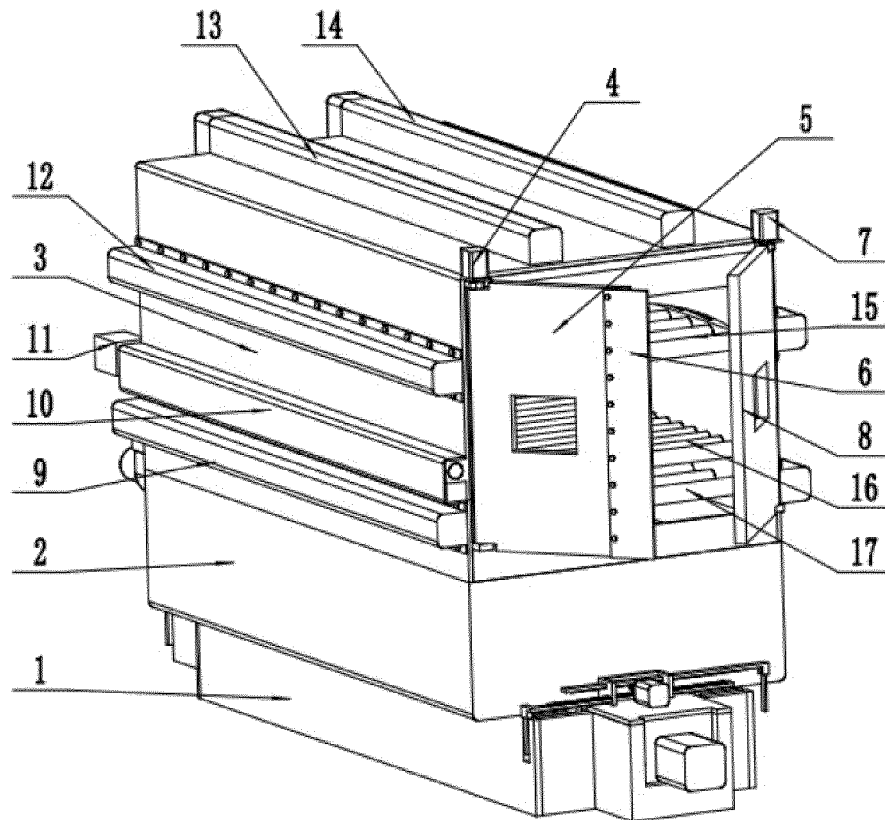


Fig. 1

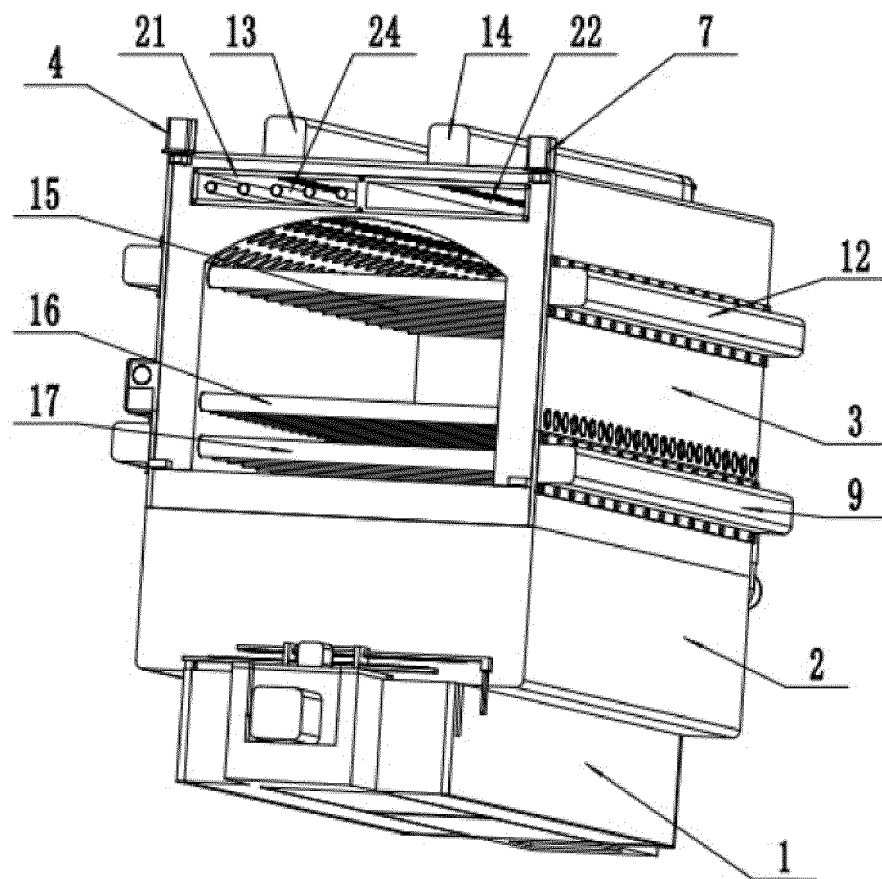


Fig. 2

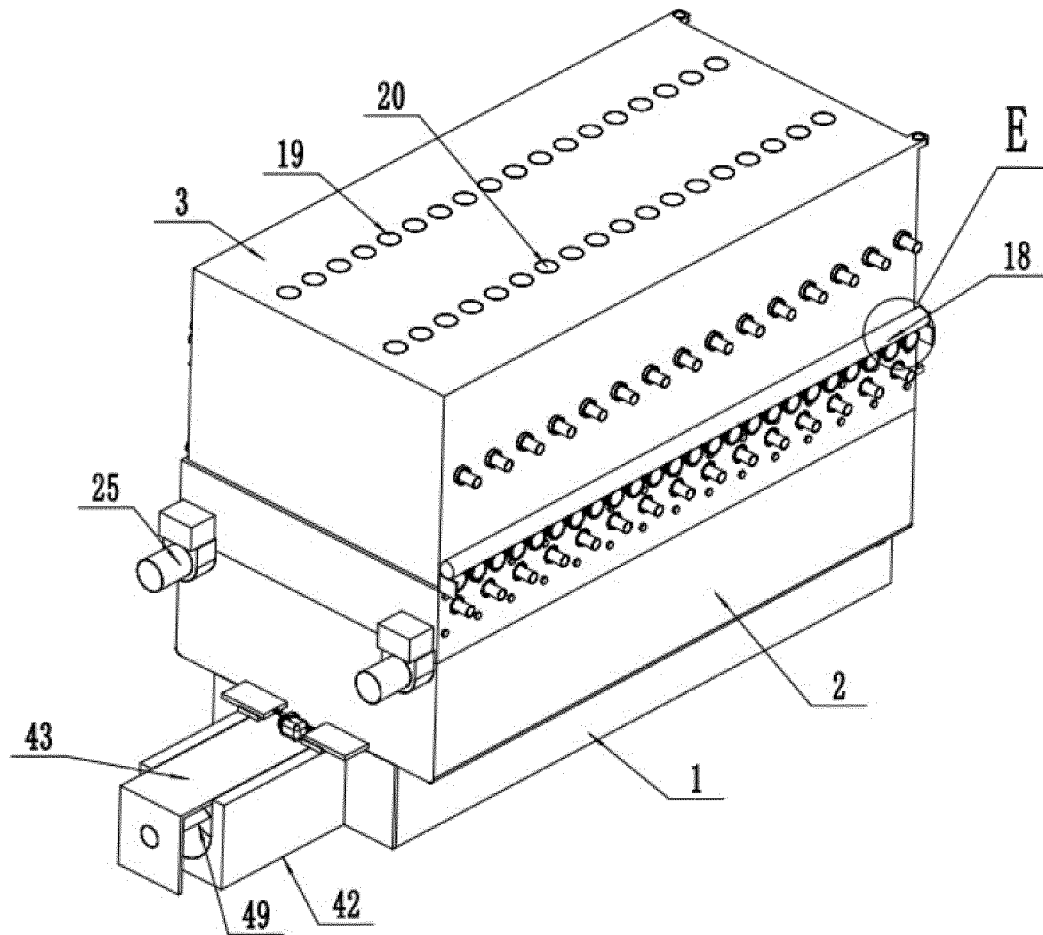


Fig. 3

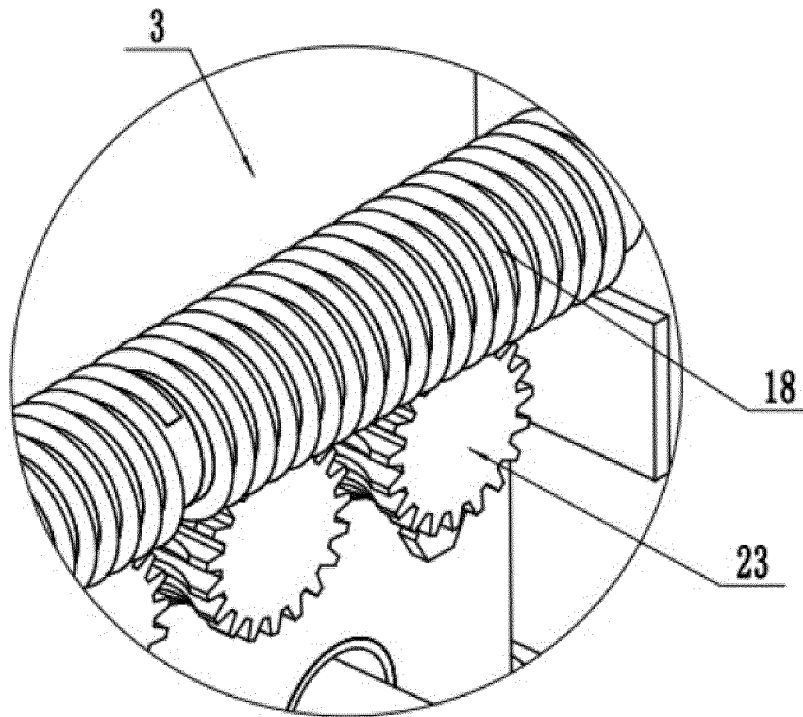


Fig. 4

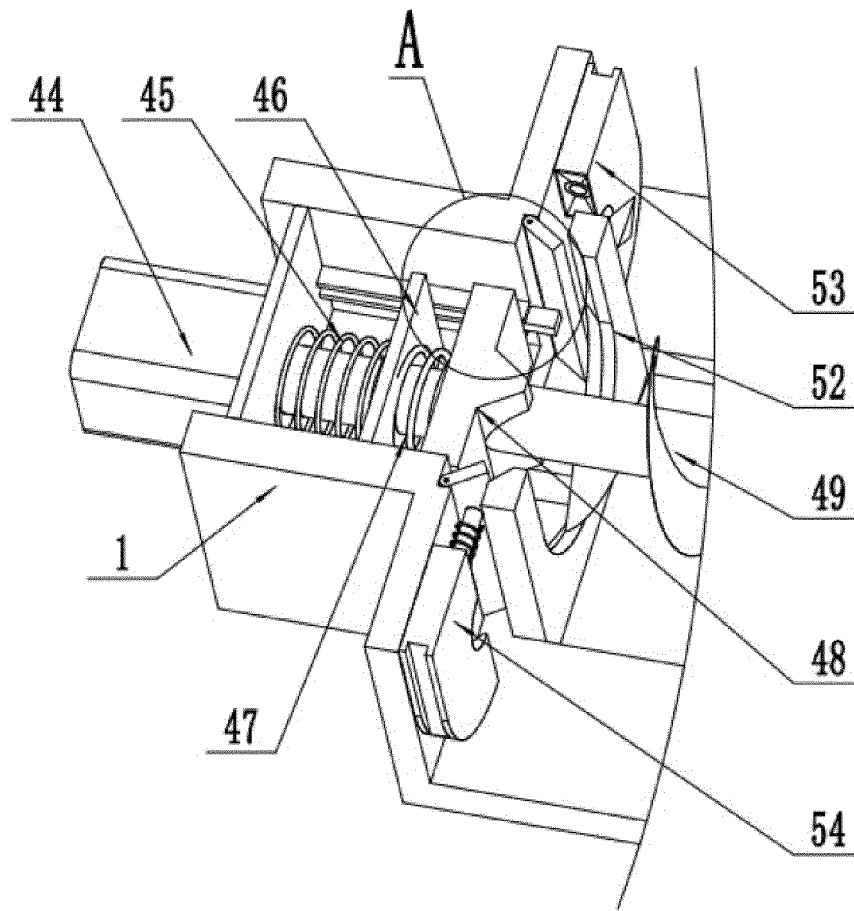


Fig. 5

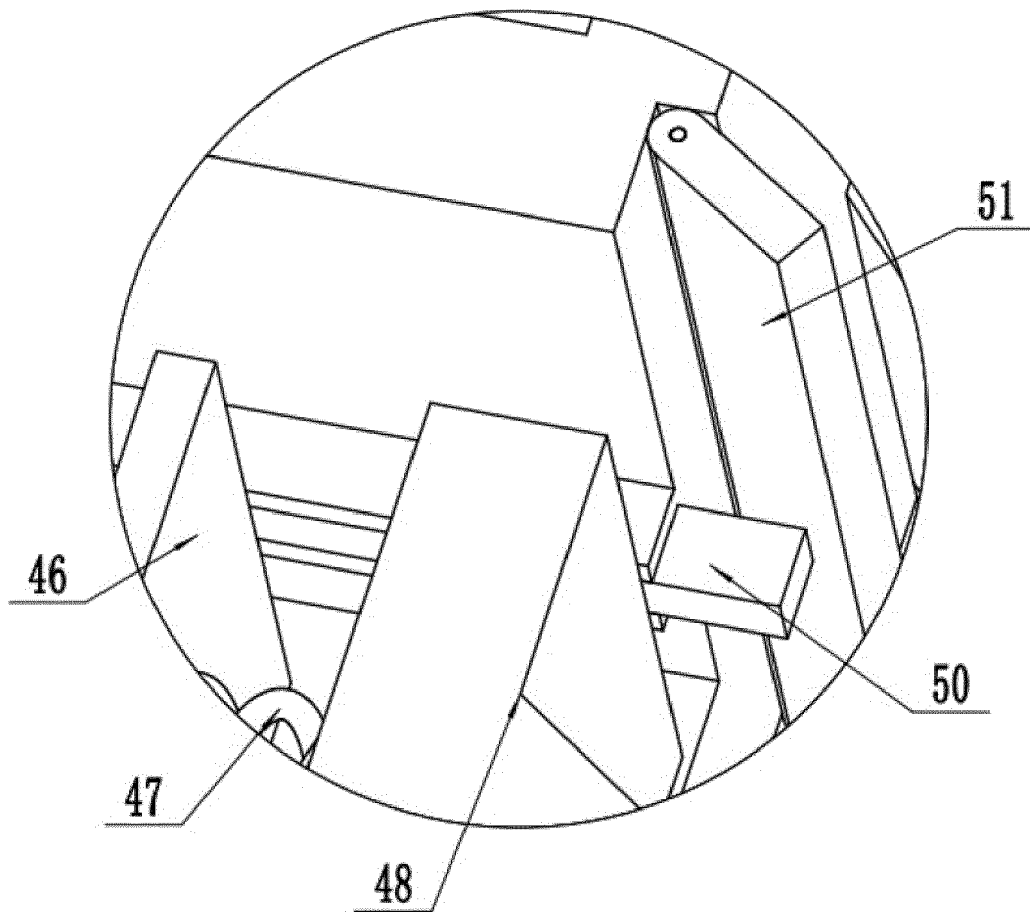


Fig. 6

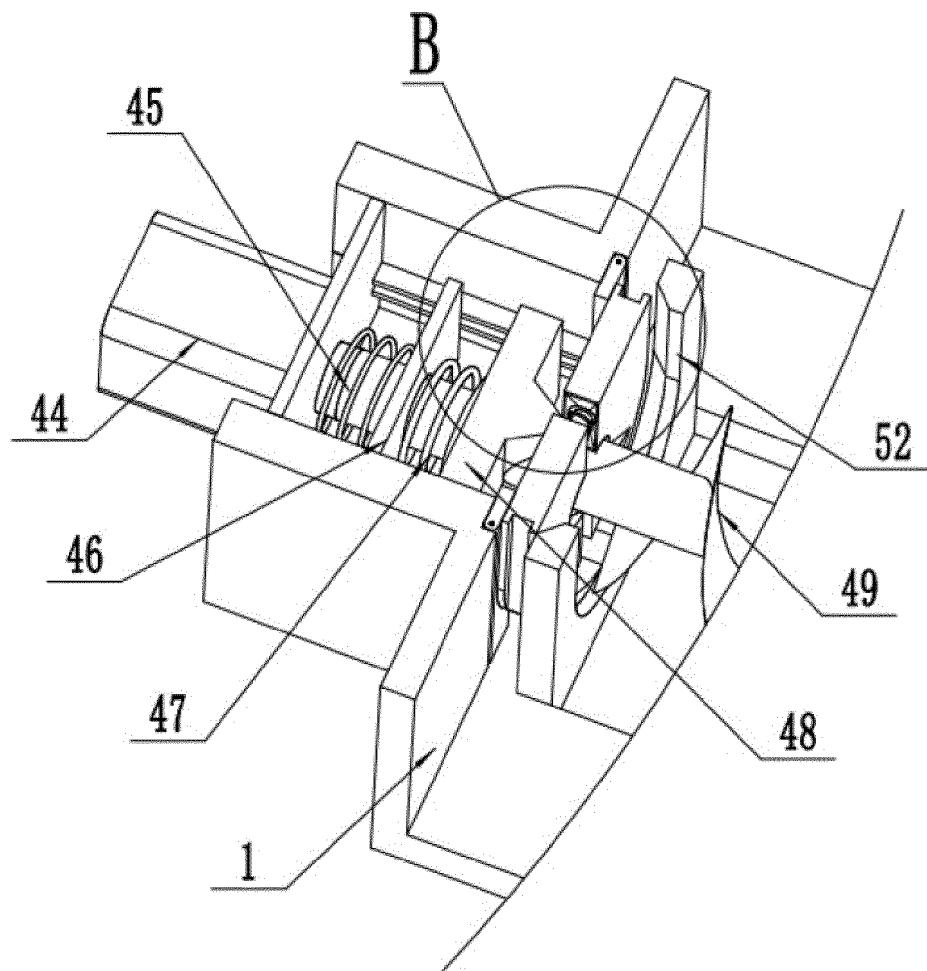


Fig. 7

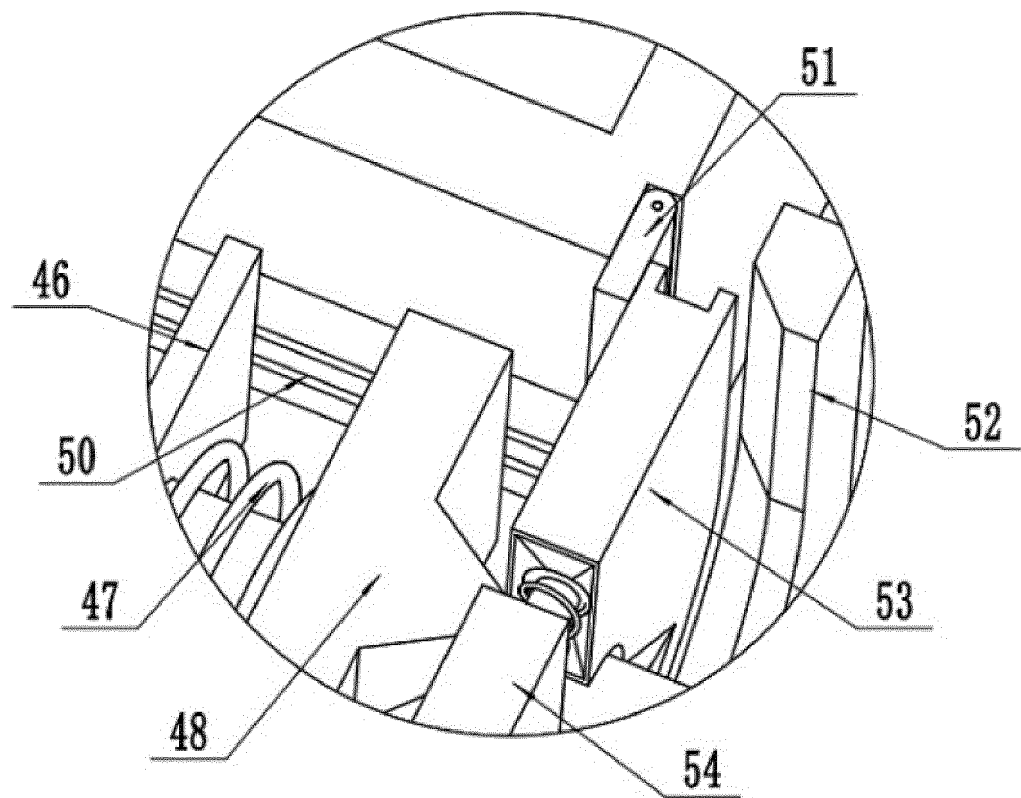


Fig. 8

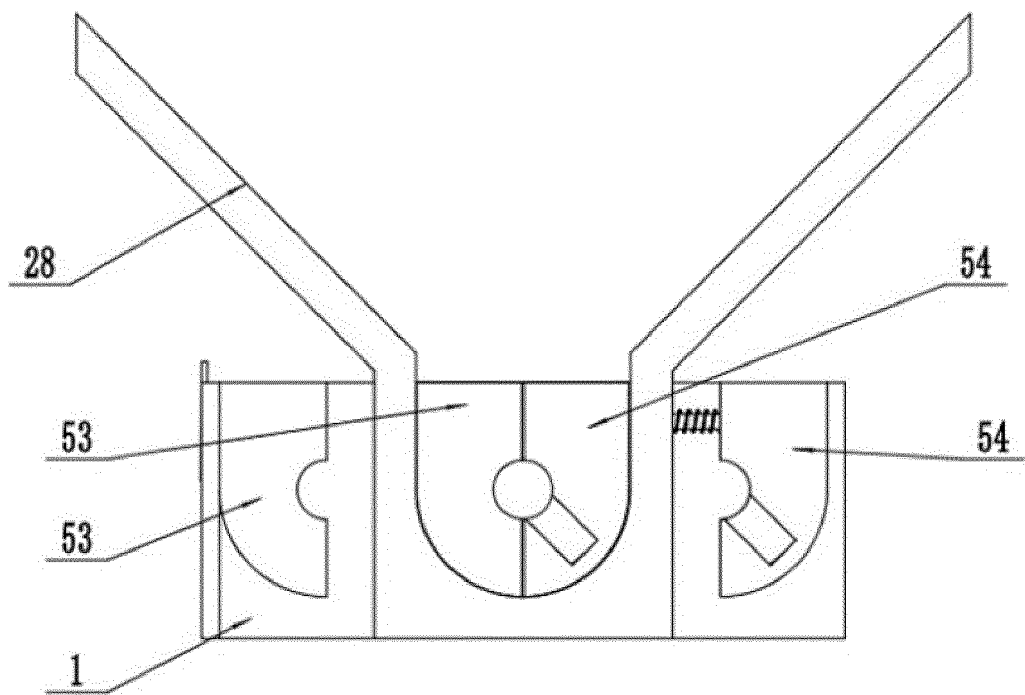


Fig. 9

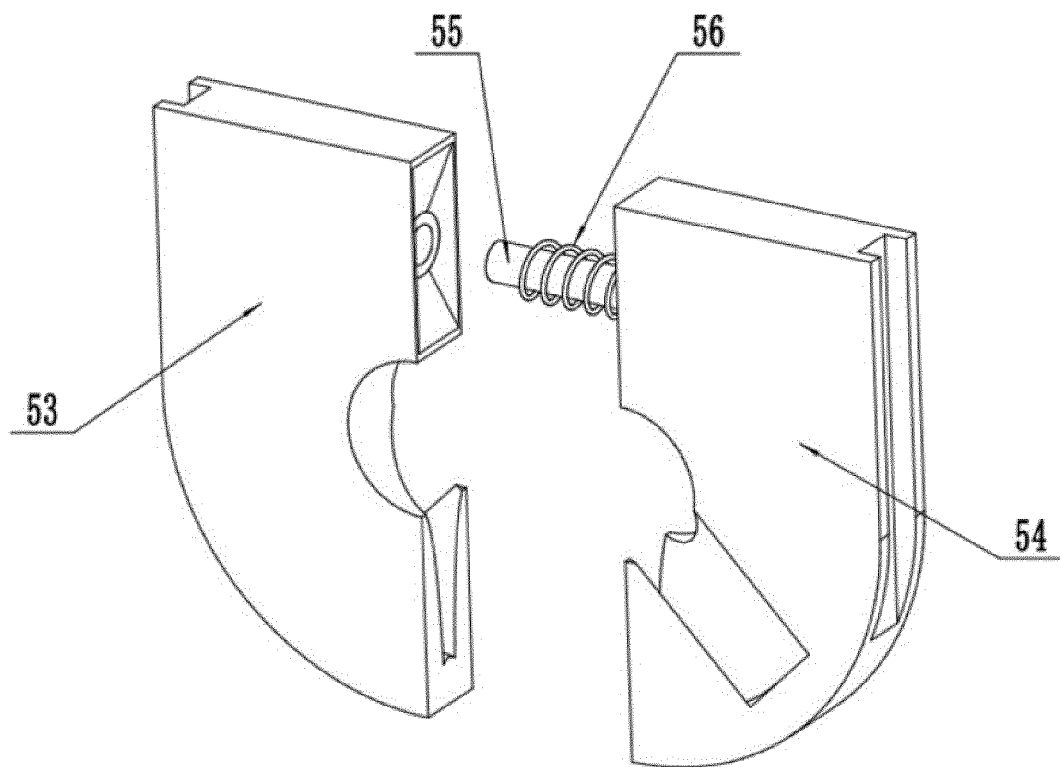


Fig. 10

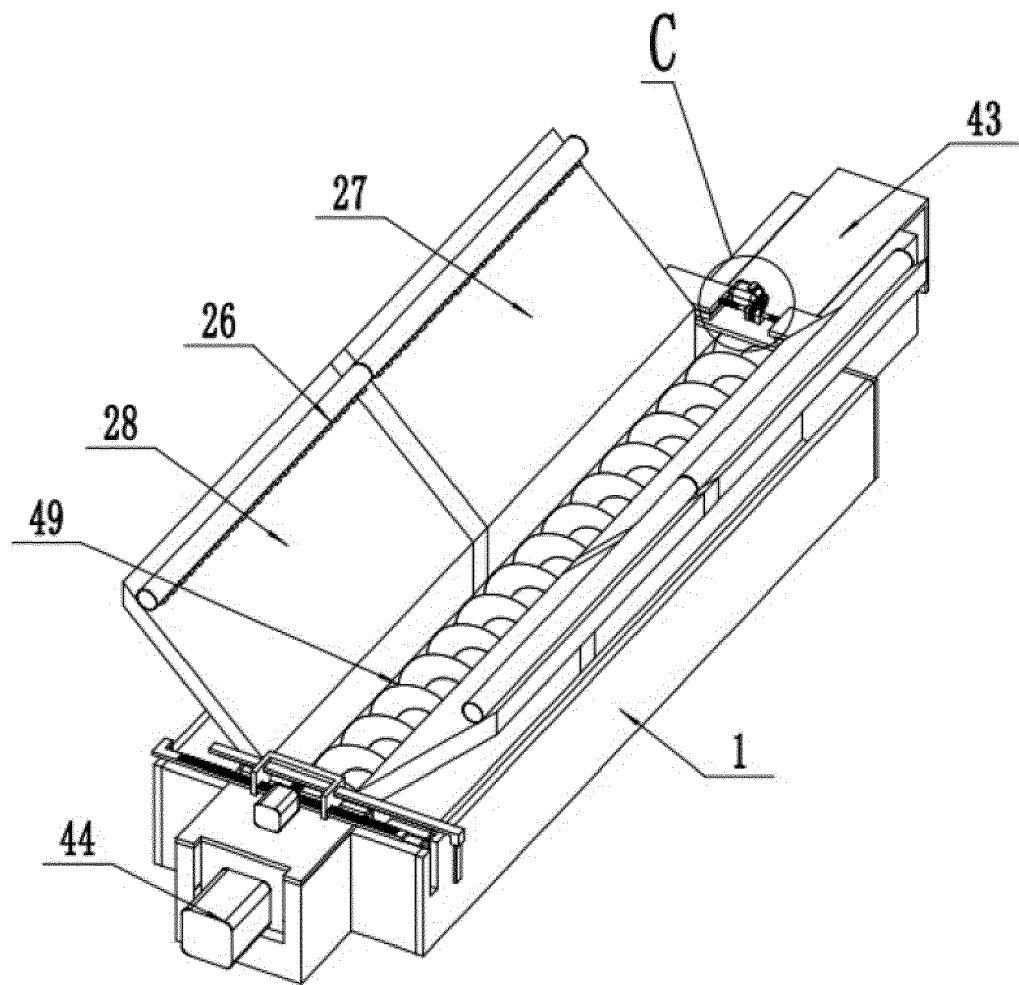


Fig. 11

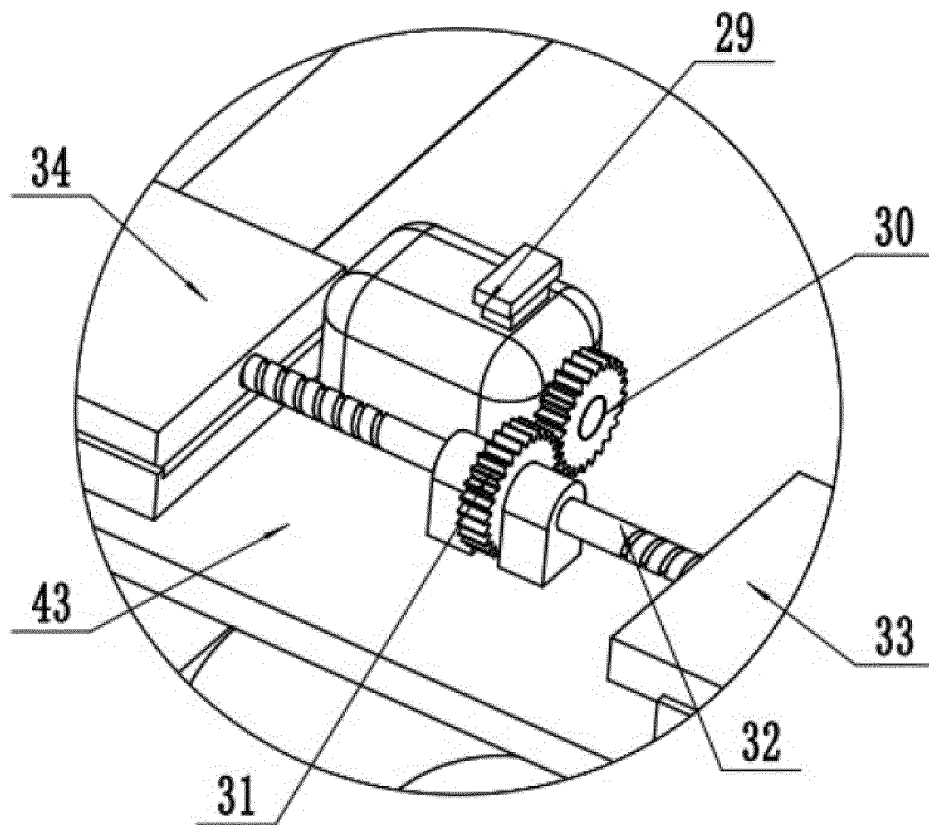


Fig. 12

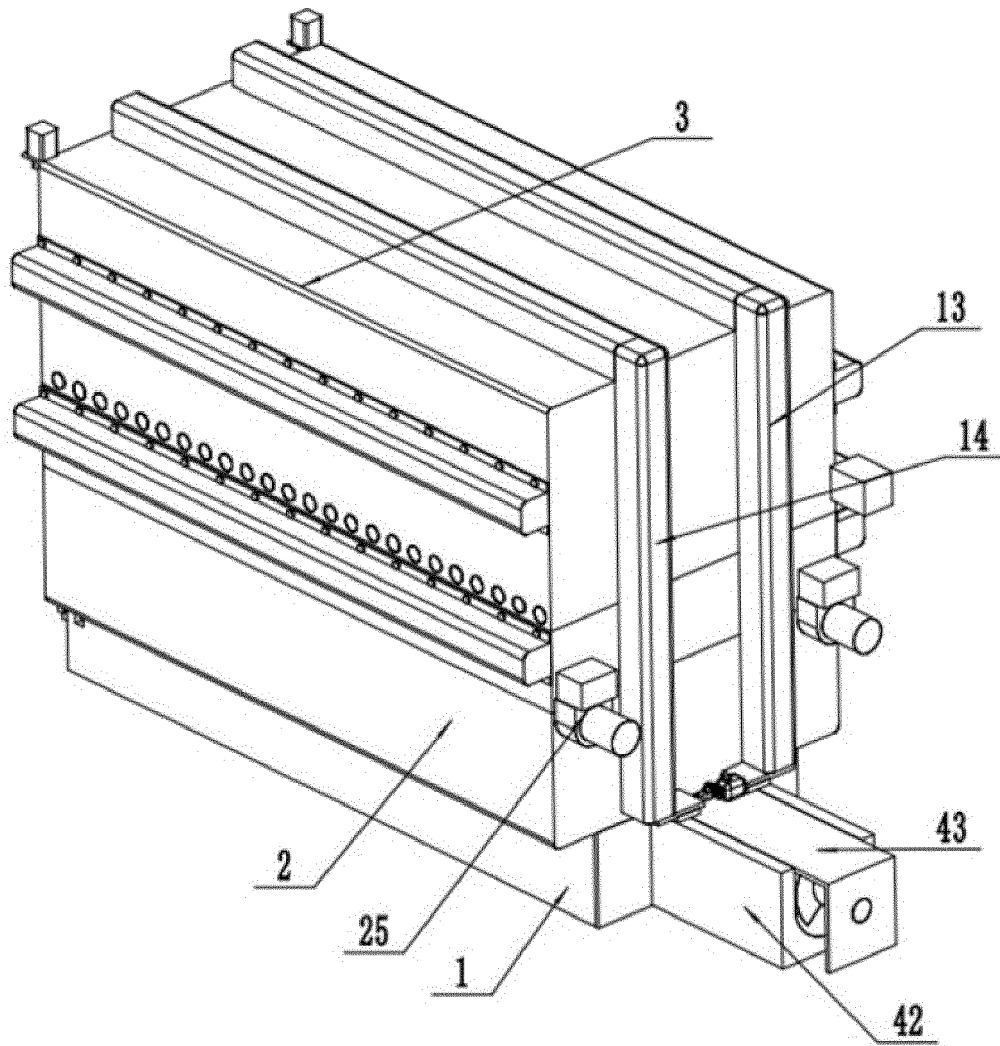


Fig. 13

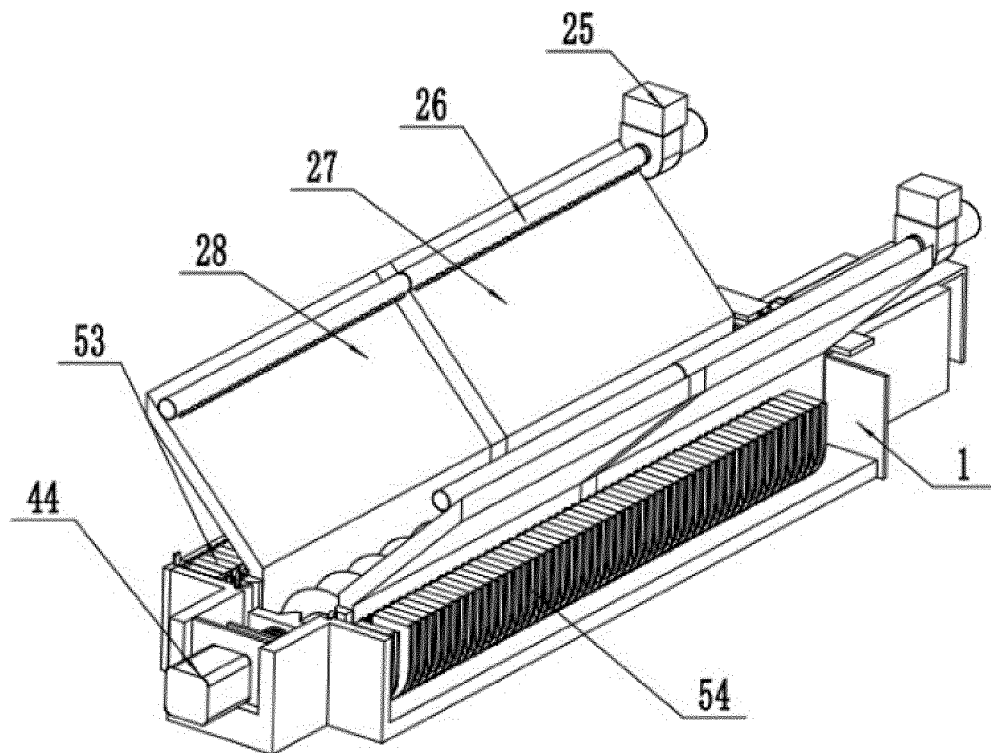


Fig. 14

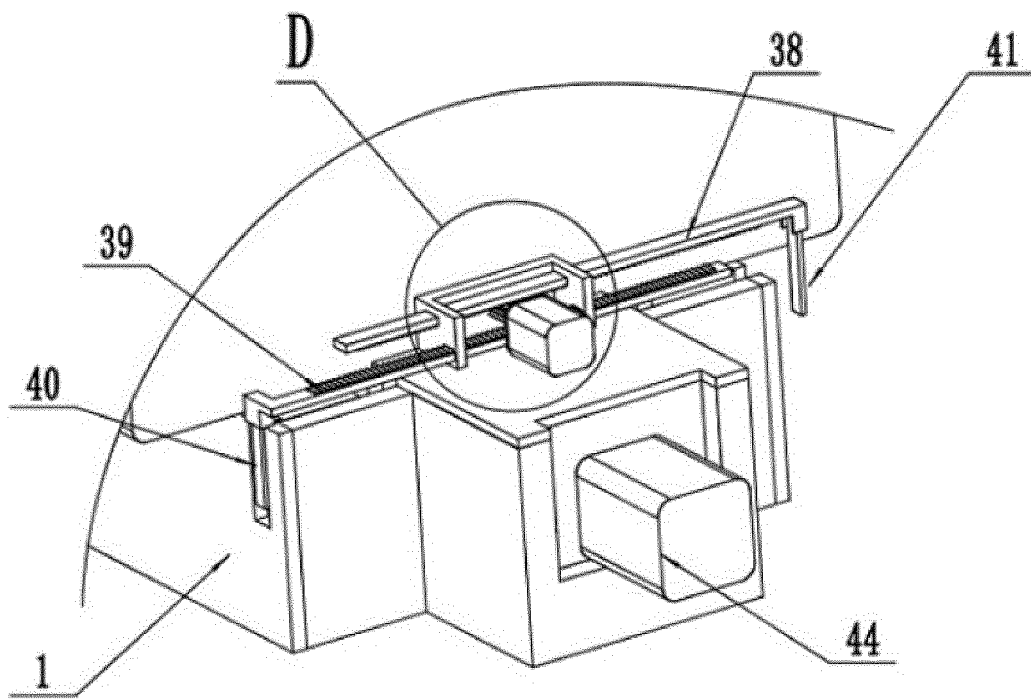


Fig. 15

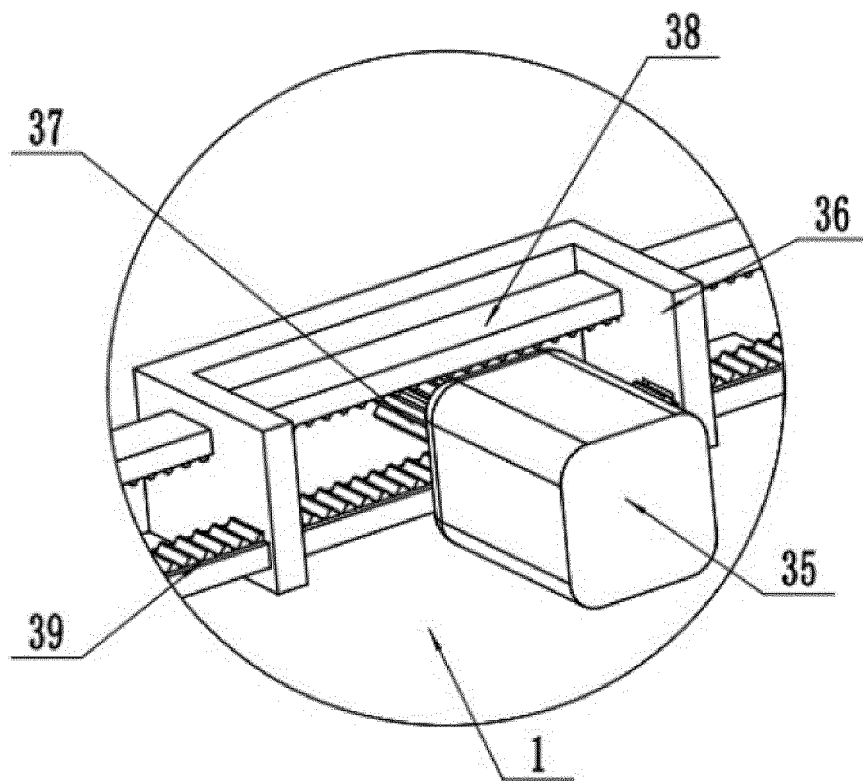


Fig. 16

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2023/116543

A. CLASSIFICATION OF SUBJECT MATTER

F27D25/00(2010.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC:F27D,B08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNTXT, CNABS, ENTXT, VEN, WPABS: 烧结炉, 粉尘, 清理, 辊, 寿命, sinter+, dust, clean+, roller, lif+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 115682754 A (JIANGSU BOTAO INTELLIGENT THERMAL ENGINEERING CO., LTD.) 03 February 2023 (2023-02-03) claims 1-8	1-7
A	CN 214250540 U (WUXI LANFENG HEAT TRANSFER TECHNOLOGY CO., LTD.) 21 September 2021 (2021-09-21) description, paragraphs [0004]-[0025], and figures 1-3	1-7
A	CN 108856228 A (YANCHENG KEAO MECHANICAL CO., LTD.) 23 November 2018 (2018-11-23) entire document	1-7
A	CN 213778685 U (INDUSTRIAL TECHNOLOGY RESEARCH INSTITUTE SUQIAN COLLEGE) 23 July 2021 (2021-07-23) entire document	1-7
A	GB 334792 A (SHERWOOD HUNTER) 11 September 1930 (1930-09-11) entire document	1-7
A	JP 2012217976 A (TECNET CO., LTD.) 12 November 2012 (2012-11-12) entire document	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

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“D” document cited by the applicant in the international application

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“O” document referring to an oral disclosure, use, exhibition or other means

“P” document published prior to the international filing date but later than the priority date claimed

“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

“&” document member of the same patent family

Date of the actual completion of the international search

22 September 2023

Date of mailing of the international search report

28 September 2023

Name and mailing address of the ISA/CN

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China No. 6, Xitucheng Road, Jimenqiao, Haidian District,
Beijing 100088

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2023/116543

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 115682754 A	03 February 2023	None	
CN 214250540 U	21 September 2021	None	
CN 108856228 A	23 November 2018	None	
CN 213778685 U	23 July 2021	None	
GB 334792 A	11 September 1930	None	
JP 2012217976 A	12 November 2012	None	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 202211507912 [0001]
- CN 213778685 U [0003]