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(54) **DRY DESULFURIZATION EQUIPMENT OF LIME ROTARY KILN.**

(57) The present disclosure provides dry desulfurization equipment of a lime rotary kiln. The dry desulfurization equipment includes a kettle body; a flue gas inlet, a flue gas outlet, and a powder inlet are formed in the kettle body; a powder spray member, a cyclone plate, and a turbulent flow subassembly are mounted in the kettle body; the powder spray member has a sprayer; the cyclone plate is located below the powder spray member; a cyclone hole is distributed on the cyclone plate; the turbulent flow subassembly includes a rotating shaft, a cyclone vane, a universal ball joint seat, and a swing vane; the rotating shaft is mounted in the kettle body in a vertical direction; the cyclone vane is located in the cyclone hole; the universal ball joint seat is fixed on the rotating shaft and is located between the powder spray member and the cyclone plate.

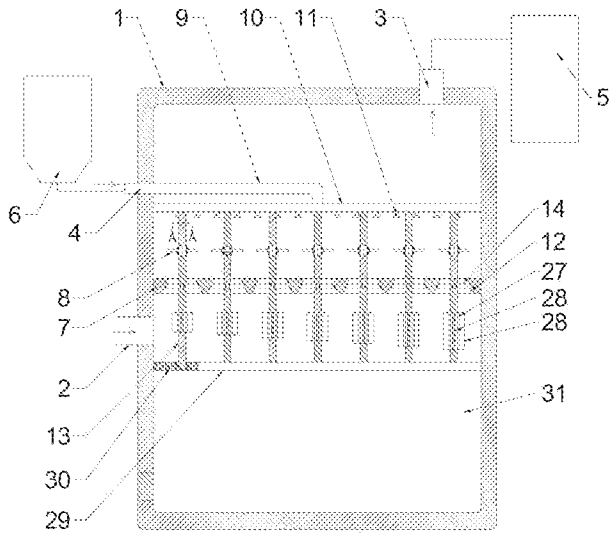

FIG. 1

DESCRIPTION

DRY DESULFURIZATION EQUIPMENT OF LIME ROTARY KILN

TECHNICAL FIELD

[0001] The present disclosure belongs to the technical field of environmental protection equipment, and specifically relates to dry desulfurization equipment of a lime rotary kiln.

BACKGROUND

[0002] In a lime rotary kiln production line, main components of flue gas include dust, sulfur dioxide, nitrogen oxides, etc. The flue gas treatment process adopted in the lime production line is as follows: High-temperature flue gas generated by calcination firstly enters a preheater for heat exchange with limestone, and the temperature decreases to 280°C or below. The flue gas then passes through a waste heat boiler for waste heat utilization, and the temperature decreases to about 160°C. After being filtered by a dust collector (30 mg/Nm^3), the flue gas is discharged into the atmosphere through a system induced draft fan and a chimney, and sulfur dioxide and nitric oxide are also discharged into the atmosphere, which causes irreversible pollution to the atmosphere.

[0003] With the continuous strengthening of the national environmental protection governance, stricter requirements are put forward for the discharge standards of industrial kilns. The concentration of the sulfur dioxide in exhaust gas is required to be less than 35 mg/Nm^3. To this end, it is necessary to research and develop a desulfurization treatment process for flue gas of a lime rotary kiln. The initial concentration of the sulfur dioxide in the flue gas of the lime rotary kiln is lower, and the existing desulfurization process usually adopts wet desulfurization or semi-wet desulfurization, which consumes a large amount of industrial water, produces a large amount of waste water, and will also increase the moisture content of coke oven flue gas. Desulfurizer preparation equipment and process are required to be equipped, so that the system is complex; the operation and maintenance are difficult; the concentration of a desulfurizer cannot be automatically adjusted according to the content of acidic substances in the flue gas at any time;

the flexibility is poor; and the desulfurization efficiency is low.

SUMMARY

[0004] The present disclosure aims to provide dry desulfurization equipment of a lime rotary kiln, so as to solve the problems of high consumption of industrial water, large waste water production, complex equipment and process, and low desulfurization efficiency in desulfurization treatment of flue gas of a lime rotary kiln.

[0005] The present disclosure provides the following technical solution:

[0006] Dry desulfurization equipment of a lime rotary kiln includes a kettle body, wherein a flue gas inlet, a flue gas outlet, and a powder inlet are formed in the kettle body; a flue gas discharging pipe of the lime rotary kiln is communicated to the flue gas inlet; the flue gas outlet is communicated to a dust remover; a powder box is communicated to the powder inlet;

[0007] a powder spray member, a cyclone plate, and a turbulent flow subassembly are mounted in the kettle body; the powder inlet is communicated to the powder spray member; the powder spray member has a plurality of sprayers with downward outlets;

[0008] the cyclone plate is located below the powder spray member; a plurality of cyclone holes are distributed on the cyclone plate;

[0009] the turbulent flow subassembly comprises a rotating shaft, a cyclone vane, a universal ball joint seat, and a swinging vane; a plurality of the rotating shafts are rotatably mounted in the kettle body in a vertical direction; a plurality of the cyclone vanes are distributed on the rotating shaft in a circumferential direction, and the cyclone vanes are located in the cyclone holes; the universal ball joint seat is fixed on the rotating shafts and is located between the powder spray member and the cyclone plate; the universal ball joint seat is a sphere having cutting surfaces on left and right sides; a spherical cavity is arranged in the universal ball joint seat; cutting openings are respectively formed in the left and right sides of the spherical cavity; a spherical steering knuckle is adapted in the spherical cavity; the swinging vanes are mounted on the steering knuckle; end parts of the swinging vanes extend out of the cutting openings of the spherical cavity; and the swinging vanes are swingable relative to the universal ball joint seat.

[0010] Preferably, each swinging vane includes a connecting shaft and vane bodies symmetrically fixedly connected to two ends of the connecting shaft; a rotating hole adapted to

the connecting shaft is formed in the middle of the steering knuckle; the connecting shaft is rotatably mounted in the rotating hole; and the vane bodies are located outside the rotating hole.

[0011] Preferably, limiting sections are respectively arranged on the left and right sides of the steering knuckle; limiting seats clung to the limiting sections are arranged at the root parts of the vane bodies; a width of each limiting seat is greater than a hole diameter of the rotating hole; and the limiting seats and the steering knuckle are connected to form a spherical structural body.

[0012] Preferably, cylindrical vane roots are further arranged at the root parts of the vane bodies; the limiting seats are connected to the bottoms of the vane roots; telescopic sleeves are mounted on the cutting surfaces of the universal ball joint seat; the telescopic sleeves seal the universal ball joint seat and the vane bodies; rigid bushings are mounted in the middle parts of the telescopic sleeves; the bushings are fitted to the vane roots; and the vane roots penetrate through the bushings.

[0013] Preferably, a rotating drum is fixedly mounted on the rotating shaft; a plurality of windward plates are circumferentially fixed on the rotating drum; and the windward plates are radially distributed by taking an axis of the rotating shaft as a center.

[0014] Preferably, a height of the rotating drum gradually increases from the rotating drum of one side close to the flue gas inlet towards the rotating drum of one side away from the flue gas inlet.

[0015] Further, an anti-settling plate is mounted in the kettle body; the anti-settling plate is located below the flue gas inlet; and powder is stacked on the anti-settling plate.

[0016] Preferably, a plurality of powder discharging holes extending in the vertical direction are formed in the anti-settling plate; and a powder collection cavity is arranged below the anti-settling plate.

[0017] Preferably, the powder spray member further includes a main powder supply pipe and a powder supply plate; a branch powder supply pipe communicated with the main powder supply pipe is mounted in the powder supply plate; and the branch powder supply pipe is communicated with the sprayer.

[0018] Preferably, upper and lower ends of the rotating shaft are respectively mounted in bearings of the powder supply plate and the anti-settling plate.

[0019] The present disclosure has the beneficial effects:

[0020] The present invention adopts dry desulfurization for the flue gas of the lime rotary kiln. Desulfurizer powder is directly sprayed into a kettle to react with the flue gas, so that the consumption of industrial water is low; the amount of wastewater is small; and the moisture content of the coke oven flue gas does not increase. The desulfurizer is directly sprayed into a flue. Without a desulfurization tower, the resistance of a lime kiln system is not increased. The system is simple, easy to operate and maintain, and has high flexibility, and the spraying volume of the desulfurizer can be automatically adjusted according to the content of acidic substances in the flue gas at any time, so as to ensure the final discharge index. The desulfurization efficiency is as high as 95% or above, and sodium sulfate which is a desulfurization by-product is high in purity, which can be easily used. The system does not need special anticorrosion; no white smoke is generated; the power consumption is low; the operation cost is low; and the occupied area is small.

[0021] In the present disclosure, the powder spray member, the cyclone plate, and the turbulent flow subassembly are mounted in the kettle body. The powder spray member downwards sprays alkaline powder, and the flue gas entering the flue gas inlet flows upwards and fully contacts the alkaline powder to achieve desulfurization. When the flue gas flow flows through the cyclone plate, the cyclone vane and the rotating shaft are impacted to rotate at a high speed, and a swirling gas flow is formed by a shear force of the cyclone vane, which changes an original linear flue gas flow direction and increases a contact area between the flue gas and the alkaline powder.

[0022] The swirling gas flow flows upwards under the action of the external induced draft fan and hits the swinging vane of the turbulent flow subassembly. Since the swinging vane is mounted on the spherical steering knuckle, and the steering knuckle is mounted in the spherical cavity of the universal ball joint seat. Therefore, the swinging vane can swing at several angles in a three-dimensional space by taking the center of the steering knuckle as a center, thus impacting the swirling gas flow and the alkaline powder from more angles and forming a disordered gas flow, which further prolongs the contact time of the gas flow and the alkaline powder, enlarges the contact area, and improves the desulfurization efficiency and the effective utilization rate of the alkaline powder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The accompanying drawings are used to provide a further understanding of the present disclosure and constitute a part of this specification to explain the present disclosure together with the embodiments of the present disclosure, and do not constitute restrictions to the present disclosure. In the drawings:

[0024] FIG. 1 is a schematic diagram of an internal structure of the present disclosure;

[0025] FIG. 2 is a schematic structural diagram of a bottom view of a cyclone plate of the present disclosure;

[0026] FIG. 3 is a schematic diagram of a sectional structure of Part A-A in FIG. 1 of the present disclosure;

[0027] FIG. 4 is a schematic diagram of an internal connection structure of a universal ball joint seat and a swinging vane of the present disclosure;

[0028] FIG. 5 is a schematic structural diagram illustrating that a swinging vane swings in a universal ball joint seat of the present disclosure.

[0029] Reference signs in the drawings: 1: kettle body; 2: flue gas inlet; 3: flue gas outlet; 4: powder inlet; 5: dust remover; 6: powder box; 7: cyclone plate; 8: turbulent flow subassembly; 9: main powder supply pipe; 10: powder supply plate; 11: sprayer; 12: cyclone hole; 13: rotating shaft; 14: cyclone vane; 15: universal ball joint seat; 16: swinging vane; 17: cutting surface; 18: spherical cavity; 19: steering knuckle; 20: connecting shaft; 21: vane body; 22: rotating hole; 23: limiting seat; 24: vane root; 25: telescopic sleeve; 26: bushing; 27: rotating drum; 28: windward plate; 29: anti-settling plate; 30: powder discharging hole; and 31: powder collection cavity.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0030] Embodiment 1

[0031] As shown in FIG. 1, dry desulfurization equipment of a lime rotary kiln includes a kettle body 1. The kettle body 1 is provided with a flue gas inlet 2, a flue gas outlet 3, and a powder inlet 4. The flue gas inlet 2 and the powder inlet 4 are both located on a side wall of the kettle body 1. The flue gas inlet 2 is located below the powder inlet 4. The flue gas outlet 3 is located on an upper side or top of the kettle body 1. A flue gas discharging pipe of the lime rotary kiln is communicated to the flue gas inlet 2, and the flue gas outlet 3 is communicated to a dust remover

5 through an induced draft fan. A powder box 6 is communicated to the powder inlet 4 through a pipeline with electromagnetic valve control. The flue gas in the lime rotary kiln enters the kettle body 1 from the flue gas inlet 2 and then upwards flows under the pumping action of the induced draft fan to contact alkaline powder (i.e. a desulfurizer) sprayed above the flue gas to achieve desulfurization. Desulfurized gas flow carrying part of the powder enters the dust remover 5 for dust removal. The spray volume of the desulfurizer can be automatically adjusted at any time according to the content of an acidic substance in the flue gas to ensure a qualified discharge index.

[0032] A powder spray member, a cyclone plate 7, and a turbulent flow subassembly 8 are mounted in the kettle body 1. The powder inlet 4 is communicated to the powder spray member. The powder spray member includes a main powder supply pipe 9, a powder supply plate 10, and a plurality of sprayers 11 with downward outlets. A branch powder supply pipe communicated with the main powder supply pipe 9 is mounted in the powder supply plate 10. The sprayers 11 are mounted at a bottom of the powder supply plate 10. The branch powder supply pipe is communicated to the sprayers 11. The sprayers 11 can downwards spray the alkaline powder, and the alkaline powder is preferably sodium hydroxide powder. A manufacturing method is: feeding block sodium hydroxide into a pot body, conveying the block sodium hydroxide into a grinding machine, and grinding the block sodium hydroxide into refined sodium hydroxide powder.

[0033] As shown in FIG. 1 and FIG. 2, the cyclone plate 7 is horizontally welded on an inner wall of the kettle body 1 and is located below the powder spray member. A plurality of cyclone holes 12 are distributed on the cyclone plate 7.

[0034] As shown in FIG. 3 to FIG. 5, the turbulent flow subassembly 8 includes a rotating shaft 13, a cyclone vane 14, a universal ball joint seat 15, and a swinging vane 16. A plurality of rotating shafts 13 are rotatably mounted in the kettle body 1 in a vertical direction. The plurality of cyclone vanes 14 are distributed on the rotating shafts 13 in a circumferential direction, and the cyclone vanes 14 are located in the cyclone hole 12. The cyclone vanes 14 are mounted in a tilted manner, each of which has an included angle with the axis of each rotating shaft 13, so as to more effectively form a rotational flow. When the flue gas flow passes through the cyclone hole 12, the cyclone vanes 14 are driven to rotate to change a linear flow direction of the gas flow, which forms swirling gas flow.

[0035] The universal ball joint seat 15 is fixed on the rotating shaft 13 and is located between the powder spray member and the cyclone plate 7. The universal ball joint seat 15 is a sphere having cutting surfaces 17 on left and right sides. A spherical cavity 18 is arranged in the universal ball joint seat 15. Cutting openings are respectively arranged on the left and right sides of the spherical cavity 18. A spherical steering knuckle 19 is adapted in the spherical cavity 18. In order to facilitate assembling of the steering knuckle 19, the universal ball joint seat 15 is formed by splicing and welding two symmetric semi-ball joint seats. The swinging vanes are mounted on the steering knuckle 19. End parts of the swinging vanes 16 extend out of the cutting openings of the spherical cavity 18. When the swinging vanes 16 are impacted by a flue gas flow from the bottom, the swinging vanes swing in a three-dimensional space relative to the universal ball joint seat 15. Swirling gas flow is disrupted to form a disordered turbulent flow, so that the flue gas fully contacts the alkaline powder, which improves the desulphurization efficiency, increases the utilization rate of the alkaline powder, and prevents the flue gas from directly flowing out of the kettle body 1 due to incomplete desulphurization.

[0036] Each swinging vane 16 includes a connecting shaft 20 and vane bodies 21 symmetrically welded to two ends of the connecting shaft 20. The width of the vane body 21 is greater than the diameter of the connecting shaft 20. A rotating hole 22 adapted to the connecting shaft 20 is formed in the middle of th steering knuckle 19. The connecting shaft 20 is rotatably mounted in the rotating hole 22. The vane bodies 21 are located outside the rotating hole 22. Therefore, the swinging vanes 16 can rotate in addition to swinging relative to the universal ball joint seat 15. When the swinging vanes rotate, the vane bodies 21 disturb the gas flow and the powder, so that the gas flow and the powder spreads around along a sectional direction of the kettle body 1, which further enlarges the contact area between the gas flow and the powder and prolongs the reaction time.

[0037] Limiting sections are respectively arranged on the left and right sides of the steering knuckle 19. Limiting seats 23 clung to the limiting sections are arranged at the root parts of the vane bodies 21. A width of each limiting seat 23 is greater than a hole diameter of the rotating hole 22, and the limiting seats 23 and the steering knuckle 19 are connected to form a spherical structural body. The limiting seats 23 are limited in the rotating hole 22 through the connecting shaft 20 to prevent the swinging vanes 16 from falling off from the rotating hole 22.

[0038] The working principle of the desulfurization equipment:

[0039] Sulfur-containing flue gas discharged by the lime rotary kiln enters the kettle body 1 and upwards flows under the action of an induced draft fan. When passing through the cyclone plate 7, the flue gas drives the cyclone vanes 14 to rotate the rotating shafts 13, thereby turning a linear gas flow into a swirling gas flow. When passing through the swinging vanes 16 of the turbulent flow subassembly 8, swirling gas flow impacts the swinging vanes 16 to swing at a non-particular angle in the three-dimensional space. At the same time, the swinging vanes 16 rotate relative to the universal ball joint seat 15 itself to further disturb the gas flow and the powder into a disordered state, so as to fully fill the kettle body 1, which enlarges the reaction area between the gas flow and the powder, prolongs the reaction time, and improves the desulfurization efficiency. After the flue gas passes through the desulfurization equipment, the concentration of sulfur dioxide is less than 13 Nmg/m^3, which is lower than the discharge requirement.

[0040] Embodiment 2

[0041] A difference between this embodiment and Embodiment 1 is that cylindrical vane roots 24 are further arranged at the root parts of the vane bodies 21, and the limiting seats 23 are connected to the bottoms of the vane roots 24. Telescopic sleeves 25 are mounted on the cutting surfaces 17 of the universal ball joint seat 15. The telescopic sleeves 25 may adopt an organ sleeve made of an anti-corrosion material or an anti-corrosion rubber sleeve with enough elasticity. The telescopic sleeves 25 can extend and retract in an up-down direction and a front-back direction. The telescopic sleeves 25 seal the universal ball joint seat 15 and the vane roots 24 of the vane bodies, so as to prevent dust from entering the universal ball joint seat 15 and ensure the reliability and flexibility of actions of the swinging vanes 16. Rigid bushings 26 are mounted in the middle parts of the telescopic sleeves 25. Inner walls of the bushings 26 are smooth and are fitted with the vane roots 24. The vane roots 24 penetrate through the bushings 26. When the swinging vanes 16 rotate, the vane roots 24 rotate in the bushings 26.

[0042] Embodiment 3

[0043] A difference between this embodiment and Embodiment 1 is that a rotating drum 27 is fixedly mounted on the rotating shaft 13. The rotating drum 27 is located below the cyclone plate 7. A plurality of windward plates 28 are circumferentially welded on the rotating drum 27. The

windward plates 28 are mounted in the vertical direction. The windward plates 28 are radially distributed by taking an axis of the rotating shaft 13 as a center. After the flue gas flow enters the kettle body 1, a gas pressure acts on the windward plates 28, thus easily driving the rotating shafts 13 to rotate. The cyclone vanes 14 rotate with the rotation of the rotating shafts 13, thus more efficiently introducing the lower gas flow to a position above the cyclone plate 7 and more easily form a rotational flow. A height of the rotating drum 27 gradually increases from one side close to the flue gas inlet 2 to one side away from the flue gas inlet 2, so that the windward plates 28 on all the rotating shafts 13 can effectively accept the impact of the flue gas flow.

[0044] An anti-settling plate 29 is mounted in the kettle body 1. The anti-settling plate 29 is located below the flue gas inlet 2. The anti-settling plate 29 is used for stacking alkaline powder to prevent most of the alkaline powder from being directly settled to the bottom of the kettle body 1. After the flue gas flow enters the kettle body 1, the alkaline powder on the anti-settling plate 29 is firstly splashed to react with the sulfur-containing gas for preliminary desulfurization, thus increasing the utilization rate of the powder. Upper and lower ends of the rotating shafts 13 are respectively mounted in bearings of the powder supply plate 10 and the anti-settling plate 29.

[0045] A plurality of powder discharging holes 30 extending in the vertical direction are formed in the anti-settling plate 29, and a powder collection cavity 31 is arranged below the anti-settling plate 29. Part of desulfurization byproducts enters the powder collection cavity 31 through the powder discharging holes 30 for collection and unified treatment.

[0046] The above descriptions are only preferred embodiments of the present disclosure and are not intended to limit the present disclosure. Although the present disclosure has been described in detail with reference to the foregoing embodiments, those skilled in the art can still modify the technical solutions in the foregoing various embodiments, or equivalently replace partial technical features. Any modifications, equivalent replacements, improvements, and the like that are made within the spirit and principle of the present disclosure shall all fall within the protection scope of the present disclosure.

CLAIMS

1. Dry desulfurization equipment of a lime rotary kiln, comprising a kettle body, wherein a flue gas inlet, a flue gas outlet, and a powder inlet are formed in the kettle body; a flue gas discharging pipe of the lime rotary kiln is communicated to the flue gas inlet; the flue gas outlet is communicated to a dust remover; a powder box is communicated to the powder inlet;

a powder spray member, a cyclone plate, and a turbulent flow subassembly are mounted in the kettle body; the powder inlet is communicated to the powder spray member; the powder spray member has a plurality of sprayers with downward outlets;

the cyclone plate is located below the powder spray member; a plurality of cyclone holes are distributed on the cyclone plate;

the turbulent flow subassembly comprises a rotating shaft, a cyclone vane, a universal ball joint seat, and a swinging vane; a plurality of the rotating shafts are rotatably mounted in the kettle body in a vertical direction; a plurality of the cyclone vanes are distributed on the rotating shaft in a circumferential direction, and the cyclone vanes are located in the cyclone holes; the universal ball joint seat is fixed on the rotating shafts and is located between the powder spray member and the cyclone plate; the universal ball joint seat is a sphere having cutting surfaces on left and right sides; a spherical cavity is arranged in the universal ball joint seat; cutting openings are respectively formed in the left and right sides of the spherical cavity; a spherical steering knuckle is adapted in the spherical cavity; the swinging vanes are mounted on the steering knuckle; end parts of the swinging vanes extend out of the cutting openings of the spherical cavity; and the swinging vanes are swingable relative to the universal ball joint seat.

2. The dry desulfurization equipment of the lime rotary kiln according to claim 1, wherein each swinging vane comprises a connecting shaft and vane bodies symmetrically fixedly connected to two ends of the connecting shaft; a rotating hole adapted to the connecting shaft is formed in the middle of the steering knuckle; the connecting shaft is rotatably mounted in the rotating hole; and the vane bodies are located outside the rotating hole.

3. The dry desulfurization equipment of the lime rotary kiln according to claim 2, wherein limiting sections are respectively arranged on the left and right sides of the steering knuckle; limiting seats clung to the limiting sections are arranged at the root parts of the vane bodies; a

width of each limiting seat is greater than a hole diameter of the rotating hole; and the limiting seats and the steering knuckle are connected to form a spherical structural body.

4. The dry desulfurization equipment of the lime rotary kiln according to claim 3, wherein cylindrical vane roots are further arranged at the root parts of the vane bodies; the limiting seats are connected to the bottoms of the vane roots; telescopic sleeves are mounted on the cutting surfaces of the universal ball joint seat; the telescopic sleeves seal the universal ball joint seat and the vane bodies; rigid bushings are mounted in the middle parts of the telescopic sleeves; the bushings are fitted to the vane roots; and the vane roots penetrate through the bushings.

5. The dry desulfurization equipment of the lime rotary kiln according to any one of claims 1 to 4, wherein a rotating drum is fixedly mounted on the rotating shaft; a plurality of windward plates are circumferentially fixed on the rotating drum; and the windward plates are radially distributed by taking an axis of the rotating shaft as a center.

6. The dry desulfurization equipment of the lime rotary kiln according to claim 5, wherein a height of the rotating drum gradually increases from the rotating drum of one side close to the flue gas inlet to the rotating drum of one side away from the flue gas inlet.

7. The dry desulfurization equipment of the lime rotary kiln according to claim 1, wherein an anti-settling plate is mounted in the kettle body; the anti-settling plate is located below the flue gas inlet; and powder is stacked on the anti-settling plate.

8. The dry desulfurization equipment of the lime rotary kiln according to claim 7, wherein a plurality of powder discharging holes extending in the vertical direction are formed in the anti-settling plate; and a powder collection cavity is arranged below the anti-settling plate.

9. The dry desulfurization equipment of the lime rotary kiln according to claim 8, wherein the powder spray member further comprises a main powder supply pipe and a powder supply plate; a branch powder supply pipe communicated with the main powder supply pipe is mounted in the powder supply plate; and the branch powder supply pipe is communicated with the sprayer.

10. The dry desulfurization equipment of the lime rotary kiln according to claim 9, wherein upper and lower ends of the rotating shaft are respectively mounted in bearings of the powder supply plate and the anti-settling plate.

Patentansprüche

1. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens, dadurch gekennzeichnet, dass sie einen Kesselkörper umfasst, wobei ein Rauchgaseinlass, ein Rauchgasauslass und ein Pulvereinlass in dem Kesselkörper ausgebildet sind; wobei ein Rauchgasauslassrohr des Kalkdrehrohrofens mit dem Rauchgaseinlass verbunden ist und der Rauchgasauslass mit einem Staubentferner verbunden ist; wobei ein Pulverkasten mit dem Pulvereinlass verbunden ist;

dass ein Pulversprühelement, eine Zyklonplatte und eine Unterbaugruppe für turbulente Strömung in dem Kesselkörper montiert sind; wobei der Pulvereinlass mit dem Pulversprühelement verbunden ist; und wobei das Pulversprühelement eine Vielzahl von Sprühern mit nach unten gerichteten Auslässen aufweist;

dass die Zyklonplatte sich unterhalb des Pulversprühelements befindet; wobei eine Vielzahl von Zyklonlöchern auf der Zyklonplatte verteilt ist;

dass die Turbulenzströmungs-Unterbaugruppe eine rotierende Welle, eine Zyklonschaufel, einen universellen Kugelgelenksitz und eine schwingende Schaufel umfasst; wobei eine Vielzahl der rotierenden Wellen drehbar in dem Kesselkörper in einer vertikalen Richtung angebracht sind; wobei eine Vielzahl der Zyklonschaufeln auf der rotierenden Welle in einer Umfangsrichtung verteilt sind und die Zyklonschaufeln in den Zyklonlöchern angeordnet sind; Wobei der kardanische Kugelgelenksitz an den rotierenden Wellen befestigt ist und sich zwischen dem Pulversprühelement und der Zyklonplatte befindet; wobei der kardanische Kugelgelenksitz eine Kugel mit Schneidflächen auf der linken und rechten Seite ist; wobei ein kugelförmiger Hohlraum in dem kardanischen Kugelgelenksitz angeordnet ist; wobei Schneidöffnungen jeweils in der linken und rechten Seite des kugelförmigen Hohlraums ausgebildet sind; wobei ein kugelförmiger Achsschenkel in den kugelförmigen Hohlraum eingepasst ist; wobei die Schwenkflügel an dem Achsschenkel angebracht sind; wobei Endteile der Schwenkflügel sich aus den Schneidöffnungen des kugelförmigen Hohlraums erstrecken; und wobei die Schwenkflügel relativ zu dem universellen Kugelgelenksitz schwenkbar sind.

2. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 1,

dadurch gekennzeichnet, dass jede Schwenkschaufel eine Verbindungswelle und Schaufelkörper umfasst, die symmetrisch fest mit zwei Enden der Verbindungswelle verbunden sind; wobei ein an die Verbindungswelle angepasstes Drehloch in der Mitte des Achsschenkels ausgebildet ist; wobei die Verbindungswelle drehbar in dem Drehloch angebracht ist und die Schaufelkörper außerhalb des Drehlochs angeordnet sind.

3. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 2, dadurch gekennzeichnet, dass Begrenzungsabschnitte jeweils auf der linken und rechten Seite des Achsschenkels angeordnet sind; wobei Begrenzungssitze, die an den Begrenzungsabschnitten befestigt sind, an den Wurzelteilen der Flügelkörper angeordnet sind; wobei eine Breite jedes Begrenzungssitzes größer als ein Lochdurchmesser des Drehlochs ist; und wobei die Begrenzungssitze und der Achsschenkel verbunden sind, um einen kugelförmigen Strukturkörper zu bilden.

4. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 3, dadurch gekennzeichnet, dass zylindrische Flügelwurzeln ferner an den Wurzelteilen der Flügelkörper angeordnet sind; wobei die Begrenzungssitze mit den Unterseiten der Flügelwurzeln verbunden sind; wobei teleskopische Hülsen an den Schnittflächen des universellen Kugelgelenksitzes angebracht sind; wobei die teleskopischen Hülsen den universellen Kugelgelenksitz und die Flügelkörper abdichten; wobei starre Buchsen in den mittleren Teilen der teleskopischen Hülsen angebracht sind; wobei die Buchsen an den Flügelwurzeln angebracht sind; und wobei die Flügelwurzeln durch die Buchsen hindurchgehen.

5. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass eine rotierende Trommel fest auf der rotierenden Welle montiert ist; wobei eine Vielzahl von luvseitigen Platten in Umfangsrichtung auf der rotierenden Trommel befestigt sind; und wobei die luvseitigen Platten radial verteilt sind, indem eine Achse der rotierenden Welle als Zentrum genommen wird.

6. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 5, dadurch gekennzeichnet, dass eine Höhe der Drehtrommel allmählich von der

Drehtrommel auf einer nahe dem Rauchgaseinlass liegenden Seite zur Drehtrommel auf einer vom Rauchgaseinlass entfernten Seite zunimmt.

7. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 1, dadurch gekennzeichnet, dass eine Antiabsetzplatte in dem Kesselkörper angebracht ist; wobei die Antiabsetzplatte unterhalb des Rauchgaseinlasses angeordnet ist; und wobei Pulver auf der Antiabsetzplatte gestapelt ist.

8. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 7, dadurch gekennzeichnet, dass eine Vielzahl von sich in vertikaler Richtung erstreckenden Pulveraustragslöchern in der Anti-Absetzplatte ausgebildet sind und ein Pulversammelhohlraum unter der Anti-Absetzplatte angeordnet ist.

9. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 8, dadurch gekennzeichnet, dass das Pulversprühelement ferner ein Hauptpulverzuführungsrohr und eine Pulverzuführungsplatte umfasst; wobei ein Zweigpulverzuführungsrohr, das mit dem Hauptpulverzuführungsrohr in Verbindung steht, in der Pulverzuführungsplatte montiert ist; und wobei das Zweigpulverzuführungsrohr mit dem Zerstäuber in Verbindung steht.

10. Trockene Entschwefelungsanlage eines Kalkdrehrohrofens nach Anspruch 9, dadurch gekennzeichnet, dass das obere und das untere Ende der rotierenden Welle jeweils in Lagern der Pulverzufuhrplatte und der Antiabsetzplatte montiert sind.

DRAWINGS

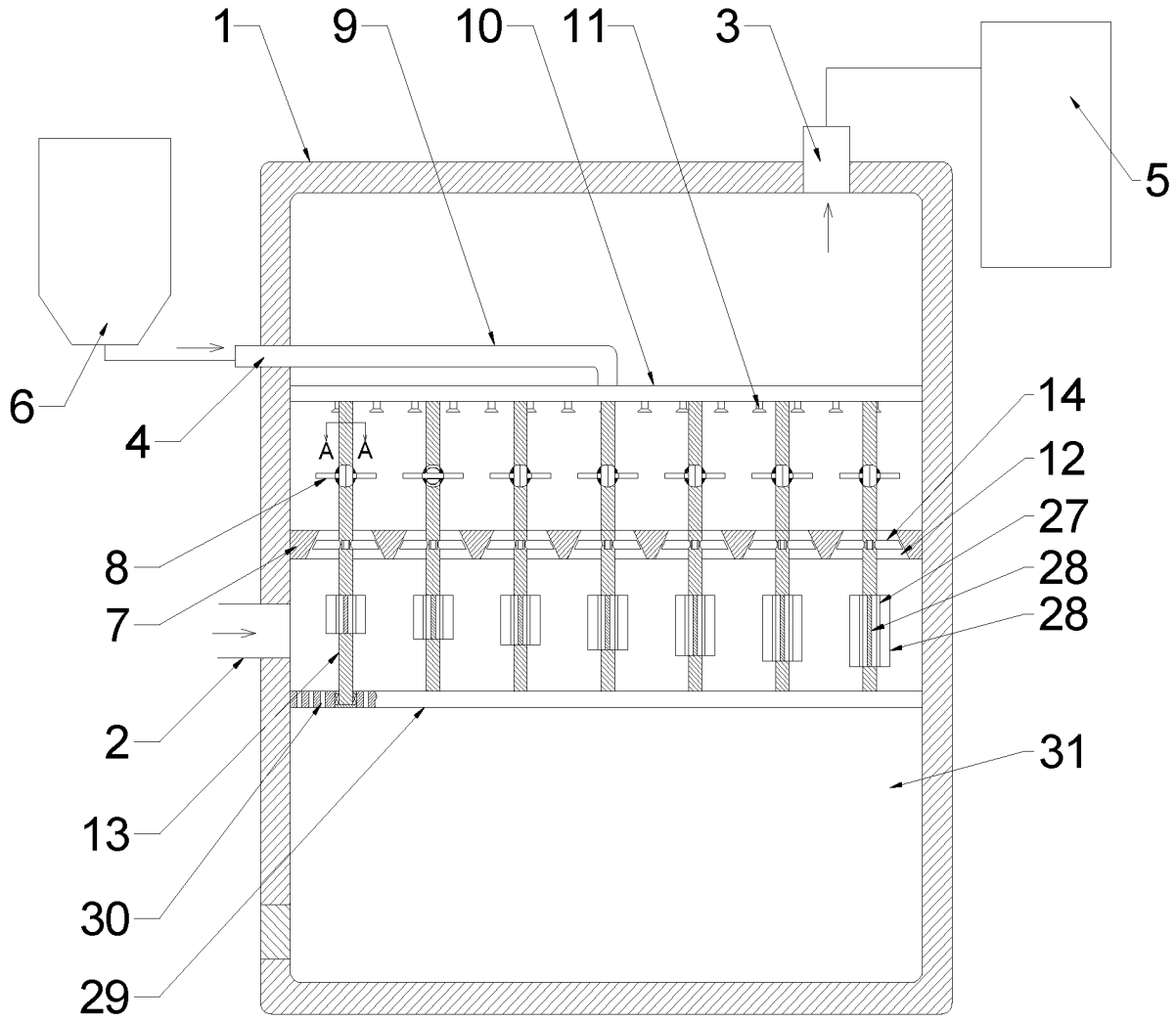

FIG. 1

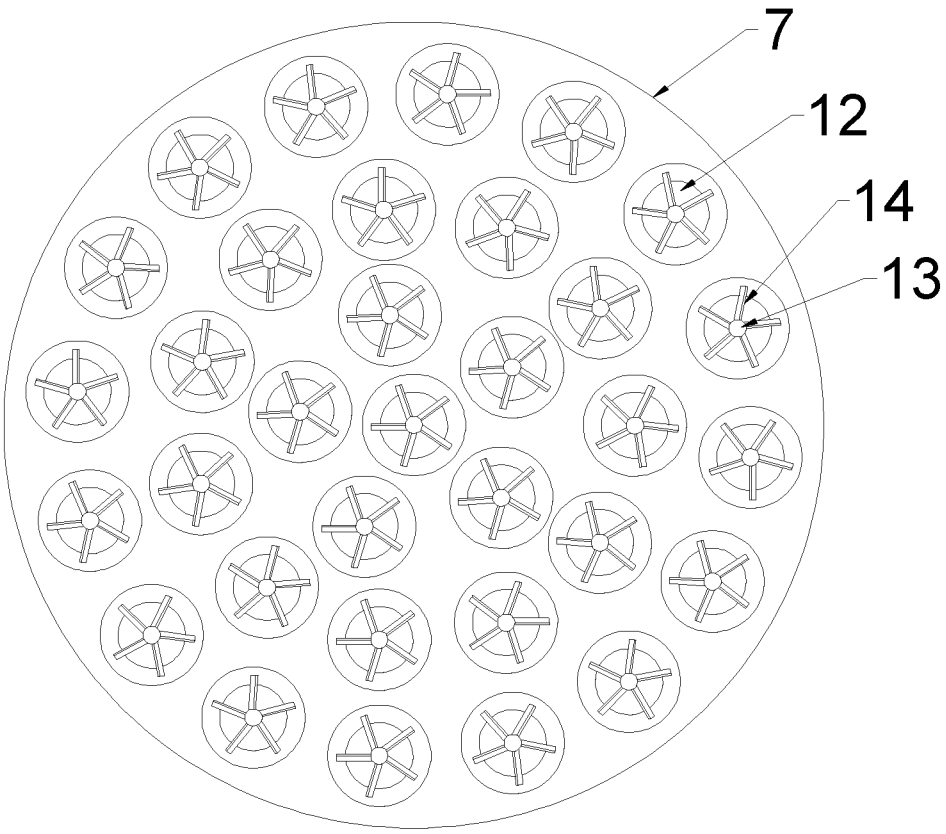

FIG. 2

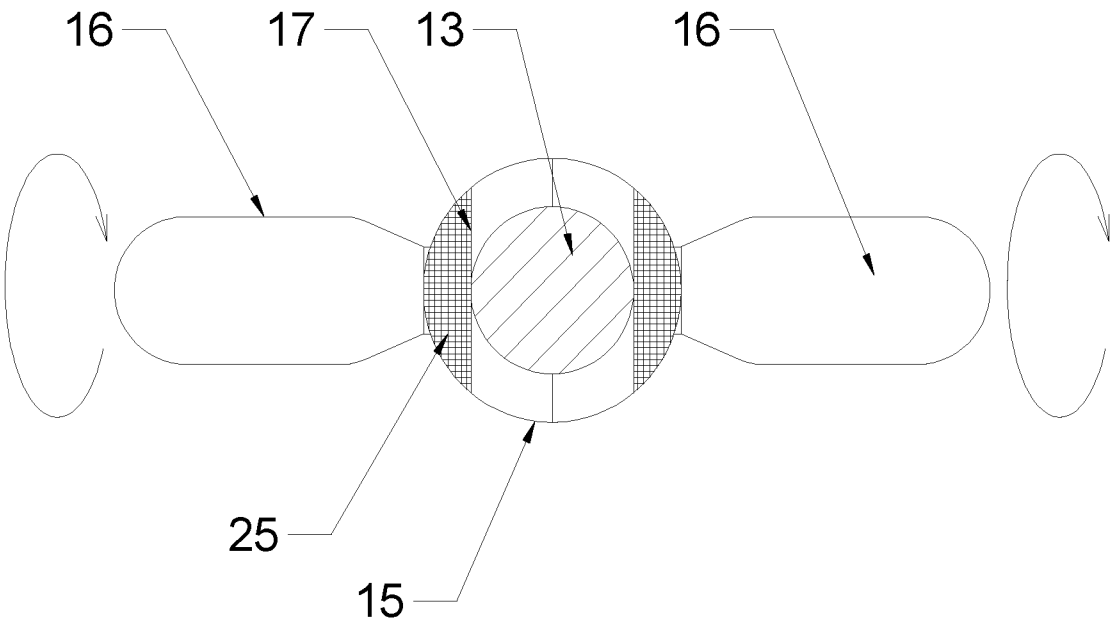

FIG. 3

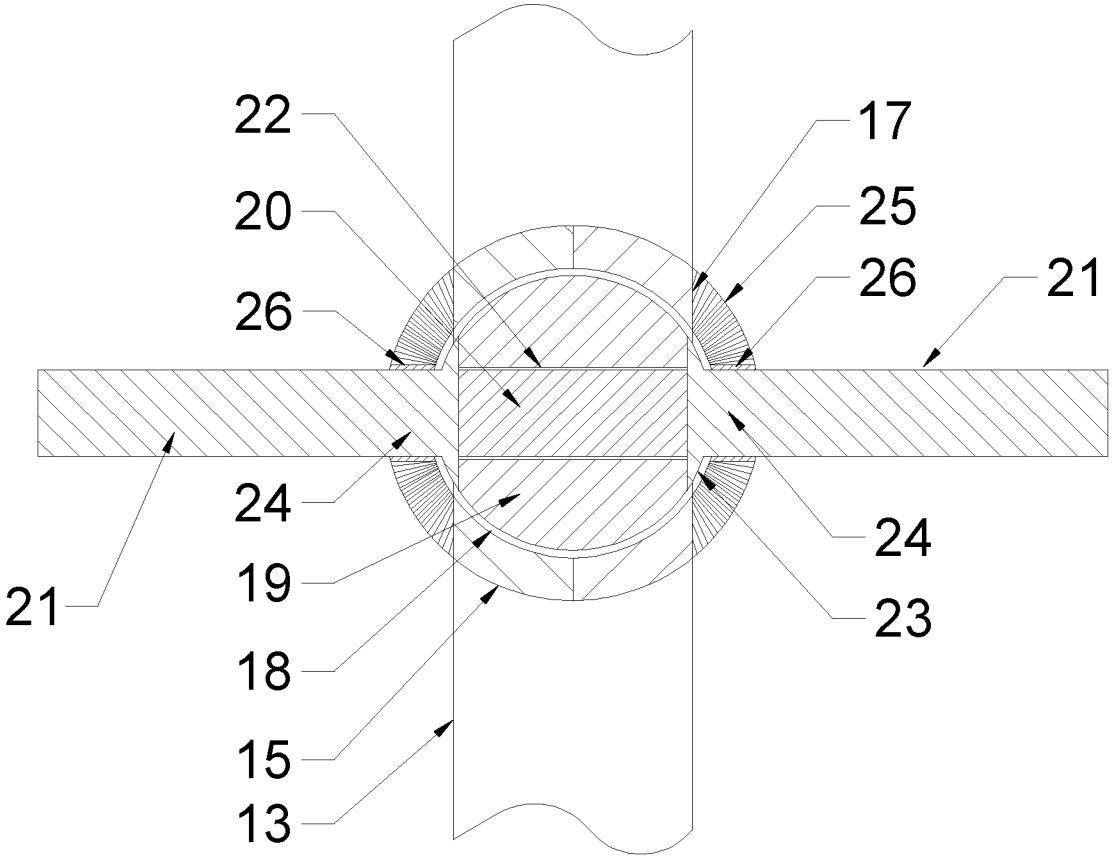

FIG. 4

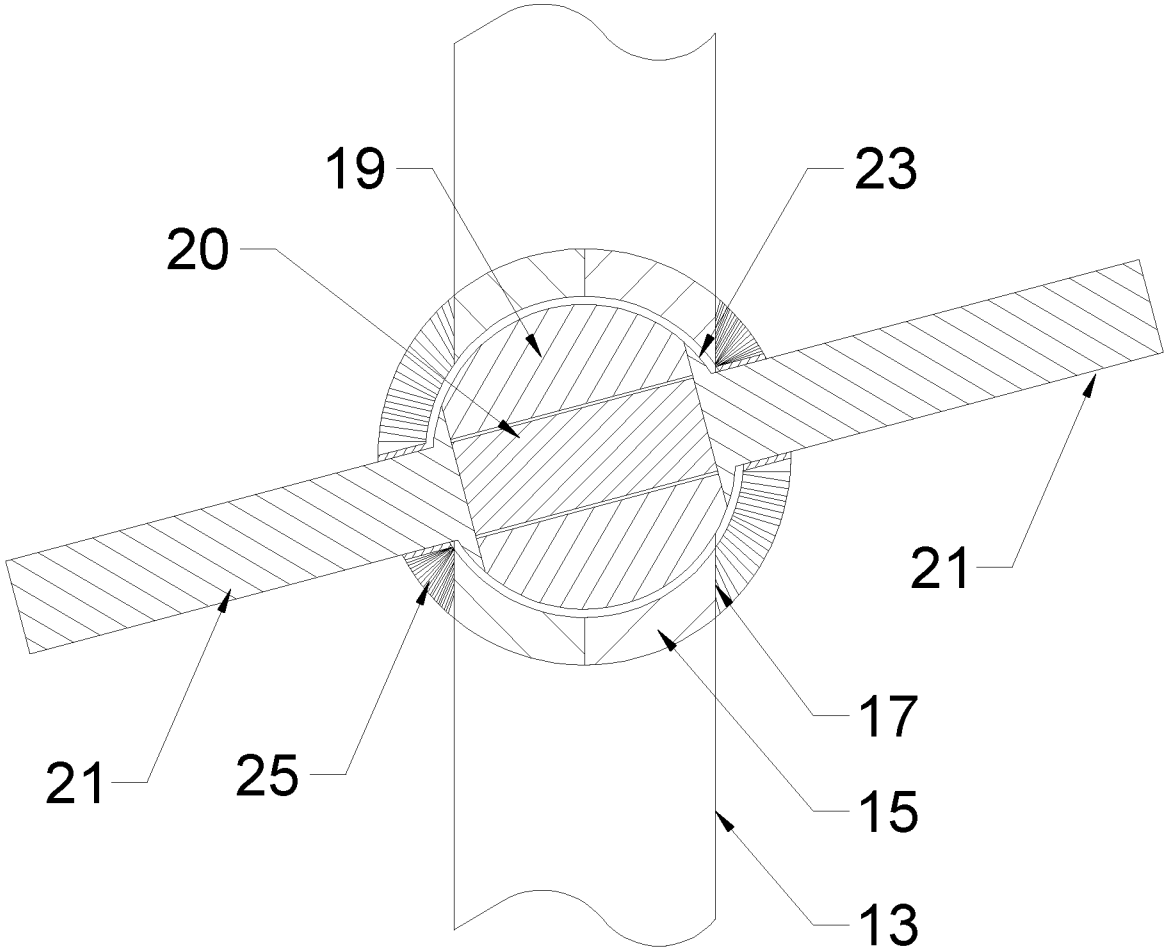

FIG. 5