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(54) **An apparatus with a seal mechanism operable between a soild fuel feed system and a combustion chamber thereof**

Ein Apparat mit einem Dichtungsmechismus, dem zwischen einem Festbrennstoffzufuhrsystem und einer Verbrennungskammer davon betrieben werden kann

Un apparat avec un mechanisme d'étancheiteplace entre un system d'alimentation en combustible solide et la chambre de combustionde ce dernier

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EP 1 560 899 B1

Description

[0001] The invention relates to a seal mechanism for a gate valve operable between a solid fuel feed system and a combustion space, such as a gasifier combustion chamber, the fuel feed system comprising a hopper having at least its bottom end portion shaped substantially cylindrical, whereby the gate valve controls the discharge opening of the feeder hopper bottom end, and the gate valve open/closed positions being controllable by means of a gate valve actuator mechanism in such a fashion that a seal is provided between the hopper bottom end and the gate valve.

[0002] In power plants and heating installations having direct feed of solid fuels into the combustion space, the combustion space such as the combustion chamber of a gas generator and the portion of the fuel feed system downstream of the fuel feed point generally need to be isolated from each other for process control and safety reasons. This kind of isolation is frequently complicated since fuel residues such as chips, peat clumps or the like objects may remain on the sealing surfaces, whereby safe sealing is problematic. Also the high temperature in the combustion chamber sets high demands on the sealing arrangement.

[0003] Conventional gate valves generally operate hingedly so that the gate plate is rotated downward to open and respectively upward to close the gate valve. Then, at the closure of the gate valve, residues of solid fuel may remain between the gate valve and its seat surface. As a result, the gate valve fails to close tightly.

[0004] In the art are also known gate valve constructions in which a sliding gate valve is pushed laterally into guide slots accommodating the gate valve plate, Also this arrangement, however, suffers from the same problem as the former construction, namely, that clumps of the solid fuel can prevent safe closure of the gate valve.

[0005] Prior-art sealing mechanisms are disclosed, e.g., in patent publications DE-AS 1132676, DE-PS 671726 and FI Pat. Appl. 782,276. Also the embodiments of these publications are hampered by the above-described shortcomings.

[0006] Document GB-A-1447628 discloses a slide valve plate below a hopper for regulating the flow material from it. The valve is held in position by upward pressure using a P-actuated switch with release of pressure being used to open the slide valve. Also the lower end of the hopper is provided with a scrabing member which makes contact with the sliding plate to close the hopper. This sealing arrangement could not be used with combustion spaces, because the sealing member consists of a polyurethane rubber moulding. The seal would not last the very hot conditions of combustion spaces.

[0007] It is an object of the present invention to provide a novel type of sealing arrangement between the solid-fuel feed system and the combustion space. The sealing arrangement according to the invention is characterized in that the lower edge of hopper is provided with a sealing member whose edge facing the gate valve plate is annular and is sharpened substantially over its entire circumferential length, and that when opening the gate valve plate it is first lowered slightly downward from its closed position and thereupon rotated aside so as to uncovered the discharge opening at the feeder hopper and that the closure of the gate valve plate is adapted to take place in reverse order, and that the sealing member is made from a metal.

[0008] Another sealing arrangement according to the invention is characterized in that the sealing member is a seal ring detachably mounted to the bottom portion of the hopper.

[0009] A still further another sealing arrangement according to the invention is characterized in that the movement of the gate valve plate, is carried out with the help of its actuator mechanism.

[0010] The invention is further characterized in that, in the opening direction of gate valve, in a close vicinity of the seal ring is mounted a doctor blade adapted to sweep the top surface of the gate valve plate clean from debris as the gate valve plate passes under the doctor blade.

[0011] A benefit of the invention is that any fuel residue possibly remaining between the gate valve plate and the sealing member edge is cut into pieces by the sharp edge of the sealing member, whereby the gate valve can close tightly. Advantageously, the gate valve plate is moved hydraulically thus allowing a sufficient force to be imposed thereon for cutting any solid fuel clumps possibly jamming the gate valve.

[0012] In the following, the invention is examined in more detail with the help of a preferred exemplary embodiment by making reference to the attached drawings in which

FIG 1 shows schematically a solid fuel hopper, a gate valve located thereunder and a combustion space below the gate valve in a closed position of the gate valve;

FIG, 2 shows the same view now with the gate valve driven slightly open; and

FIG. 3 shows schematically a view taken from below the fuel hopper, now the gate fully opened, that is, rotated aside from below the hopper.

[0013] Referring to FIG 1, therein is shown designated by reference numeral 1 a solid fuel hopper that has its bottom portion made at least partially cylindrical and is adapted to feed fuel further into a combustion space 2. Between hopper 1 mounted on a feeder system frame 8 and combustion space 2 is placed a gate valve 3 that can be driven closed so as to cover the cylindrical bottom opening of the hopper. The function of gate valve 3 is to provide sealed isolation of the fuel feed system from the combustion space.

[0014] To the bottom portion of the hopper is made or

attached an annular seal member whose lower edge tapers downward so as to form a sharp annular cutting rim in cooperation with gate valve plate 3. As the seal member 4 is metallic, it offers an extremely good service life in regard to conventional seals. By way of using a dismountable annular seal as the seal member, the seal can be removed for resharpening when necessary.

[0015] In the diagrams, reference numerals 5 and 6 designate the actuator mechanism of gate valve plate 3 employed for opening and closing the gate valve. In FIG. 1, gate valve 3 is shown in its closed position in which the sharp edge of the annular seal member 4 faces gate valve plate 3. To open the gate valve, the gate valve plate is first lowered by the gate valve actuator mechanism 5, 6 slightly apart from the annular seal member 4 as shown in FIG. 2. In the next phase, the same mechanism performs the rotation of the gate valve into the position shown in FIG 3, wherein the gate valve is entirely removed from below hopper 1 thus allowing the solid fuel to fall from hopper 1 into combustion space 3. Simultaneously as gate valve plate 3 is rotated aside, its top surface meets a doctor blade 7 that sweeps the gate valve plate 3 clean from debris.

[0016] To close gate valve 3, the gate valve plate is rotated from the horizontal position of FIG. 2 to a closing position below feeder hopper 1. Also during this movement, doctor blade 7 cleans the top surface of gate valve plate 3. At the instant the gate valve plate is in its correct closing position below hopper 1, the gate valve plate is elevated against the annular sealing member 4 applying a vigorous force exerted by hydraulical means, for instance, such that any possible debris still adhering to the gate valve plate top surface is cut apart by the sharp edge of the annular sealing member thus permitting sealed closure of the gate valve.

[0017] To a person skilled in the art it is obvious that the invention is not limited to the exemplary embodiment described above, but rather, can be varied within the scope of the appended claims.

Claims

1. An apparatus comprising the combination of seal mechanism comprising a gate valve plate (3) operable between a solid fuel feed system (1) and a combustion space (2), such as a gas generator combustion chamber, the fuel feed system comprising a hopper (1) having at least its bottom end portion shaped substantially cylindrical, whereby the gate valve plate (3) controls the discharge opening of the hopper bottom end, and the open/closed positions of the gate valve plate being controllable by means of a gate valve actuator mechanism (5, 6) in such a fashion that a seal is provided between the bottom end of hopper (1) and gate valve plate (3), **characterized in that** the lower edge of hopper (1) is provided with a sealing member (4) whose edge facing the gate valve plate (3) is annular and is sharpened substantially over its entire circumferential length, and the actuator mechanism (5, 6) being adapted such that when opening the gate valve plate (3) it is first lowered slightly downward from its closed position and thereupon rotated aside, and that the closure of the gate valve plate is adapted to take place in reverse order, and that the sealing member is made from a metal.

2. The apparatus of claim 1, **characterized in that** the sealing member (4) is a seal ring detachably mounted to the bottom portion of the hopper.

3. The apparatus of any one of claims 1 and 2, **characterized in that** the movement of the gate valve plate (3) is carried out with the help of its actuator mechanism (5, 6).

4. The apparatus of any one of claims 1 - 3, **characterized in that**, in the opening direction of gate valve (3), in a close vicinity of the seal ring (4) is mounted a doctor blade (7) adapted to sweep the top surface of the gate valve plate clean from debris as the gate valve plate passes under the doctor blade.

Patentansprüche

1. Vorrichtung, umfassend die Kombination eines Dichtungsmechanismus umfassend eine Absperrventilplatte (3), welche zwischen einem Festbrennstoff Zuführsystem (1) und einem Verbrennungsraum (2), wie einer Gaserzeuger-Verbrennungskammer, betriebsfähig ist, wobei das Brennstoff-Zuführsystem einen Behälter (1) umfasst, bei welchem zumindest sein Bodenendabschnitt im wesentlichen zylindrisch geformt ist, wobei die Absperrventilplatte (3) die Abgabeöffnung des Behälterbodenendes steuert und die Öffnungs-/Schliess-Stellungen der Absperrventilplatte mittels eines Absperrventil-Aktuatormechanismus (5, 6) in solch einer Weise steuerbar sind, dass eine Abdichtung zwischen dem Bodenende des Behälters (1) und der Absperrventilplatte (3) vorgesehen wird, **dadurch gekennzeichnet, dass** die untere Kante des Behälters (1) mit einem Dichtelement (4) versehen ist, dessen auf die Absperrventilplatte (3) weisende Kante ringförmig und im wesentlichen über ihre gesamte Umfangslänge geschärft ist und wobei der Aktuatormechanismus (5, 6) derart ausgelegt ist, dass, wenn dieser die Absperrventilplatte (3) öffnet, sie ausgehend von ihrer geschlossenen Stellung zunächst geringfügig nach unten gesenkt und daraufhin zur Seite gedreht wird, und dass das Schliessen der Absperrventilplatte geeignet ist, in umgekehrter Reihenfolge stattzufinden, und dass das Dichtungselement aus Metall hergestellt ist

2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Dichtungselement (4) ein Dichtungsring ist, welcher abnehmbar an dem Bodenabschnitt des Gefässes angebracht ist.

3. Vorrichtung nach irgendeinem der Ansprüche 1 und 2, **dadurch gekennzeichnet, dass** die Bewegung der Absperrventilplatte (3) mit Hilfe ihres Aktuatormechanismus (5, 6) ausgeführt wird

4. Vorrichtung nach irgendeinem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** in der Öffnungsrichtung des Absperrventils (3) in einer nahen Umgebung des Dichtungsrings (4) ein Abstreifmesser (7) angebracht ist, welches geeignet ist, die obere Oberfläche der Absperrventilplatte frei von Ablagerungen abzukehren, wenn die Absperrventilplatte unter dem Abstreifmesser hindurchläuft

Revendications

1. Appareil comprenant la combinaison d'un mécanisme formant joint comportant une plaque formant robinet-vanne (3) pouvant être disposé entre un système d'alimentation en carburant solide (1) et un espace de combustion (2), tel qu'une chambre de combustion de générateur de gaz, le système d'alimentation en carburant comprenant une trémie (1) ayant au moins sa partie d'extrémité inférieure de forme sensiblement cylindrique, de sorte que la plaque formant robinet-vanne (3) commande l'ouverture de décharge de l'extrémité inférieure de la trémie, et les positions ouverte / fermée de la plaque formant robinet-vanne pouvant être commandées au moyen d'un mécanisme d'actionnement de robinet-vanne (5, 6) de sorte qu'un joint soit réalisé entre l'extrémité inférieure de la trémie (1) et une plaque formant robinet-vanne (3), **caractérisé en ce que** le bord inférieur de la trémie (1) est muni d'un élément d'étanchéité (4) dont le bord faisant face à la plaque formant robinet-vanne (3) est annulaire et est à chant vif sensiblement sur la totalité de sa longueur circonférentielle, et **en ce que** le mécanisme d'actionnement (5, 6) est conçu de sorte que lors de l'ouverture de la plaque formant robinet-vanne (3), il est d'abord abaissé légèrement vers le bas à partir de sa position fermée et par conséquent tourné sur le côté, et **en ce que** la fermeture de la plaque formant robinet-vanne est conçue pour avoir lieu dans l'ordre inverse, et **en ce que** l'élément d'étanchéité est fait de métal.

2. Appareil selon la revendication 1, **caractérisé en ce que** l'élément d'étanchéité (4) est une bague d'étanchéité montée de façon amovible sur la partie inférieure de la trémie.

3. Appareil selon l'une quelconque des revendications 1 et 2, **caractérisé en ce que** le mouvement de la plaque formant robinet-vanne (3) est effectué à l'aide de son mécanisme d'actionnement (5, 6).

4. Appareil selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que**, dans le sens d'ouverture du robinet-vanne (3), dans un voisinage proche de la bague d'étanchéité (4) est montée une raclette de nettoyage (7) conçue pour débarrasser la surface supérieure de la plaque formant robinet-vanne des débris lorsque la plaque formant robinet-vanne passe sous la raclette de nettoyage.

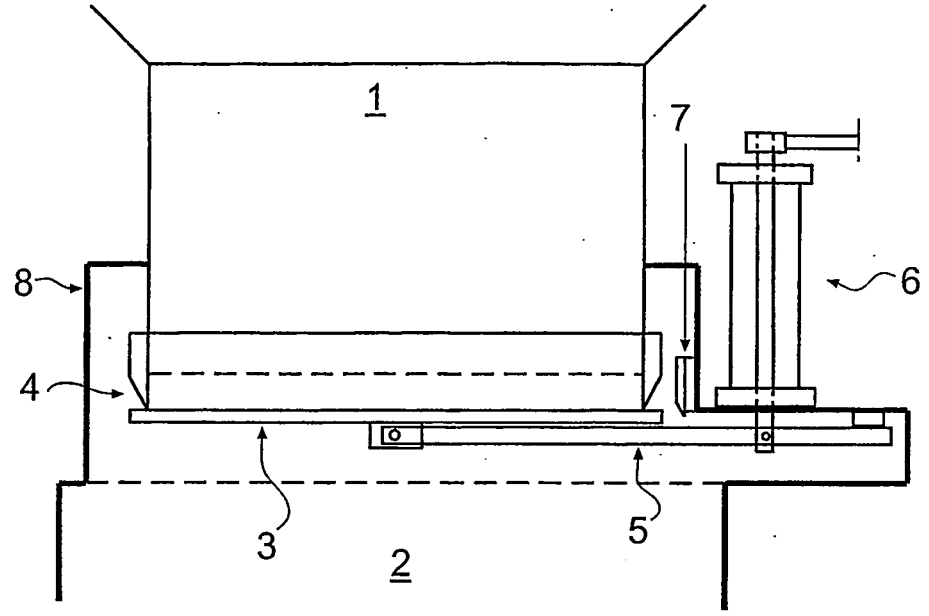


Fig. 1

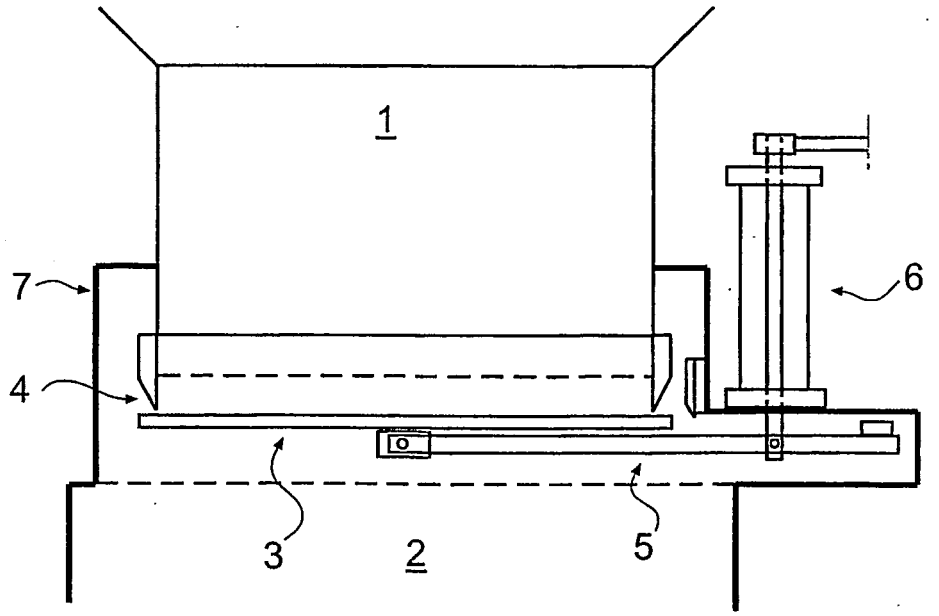


Fig. 2

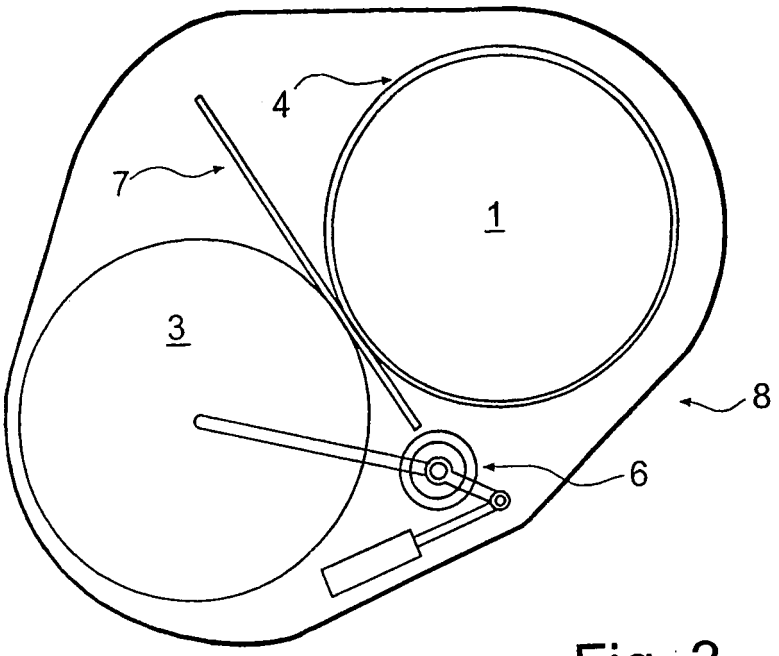


Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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