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(72) Inventor: **Svendsen Jens Jorgen**
DK-3450 Allerød (DK)

(74) Representative: **Carlsson, Eva et al**
Internationalt Patent-Bureau,
23 Hoje Taastrup Boulevard
2630 Taastrup (DK)

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(71) Applicant: **FLS MILJO A/S**
2500 Valby (DK)

(54) **Gate arrangement for straw firing plant**

(57) The gate arrangement comprises a tilting gate, the gate member (6) being pivotally connected with the said housing (1) in a hinge connection (7) at the side surfaces (5) of the gate opening with a substantially hor-

izontal axis of rotation (11) at right angles to the said transport path. The gate member (6) is shaped like a curved surface, which is a cylinder surface in a special embodiment.

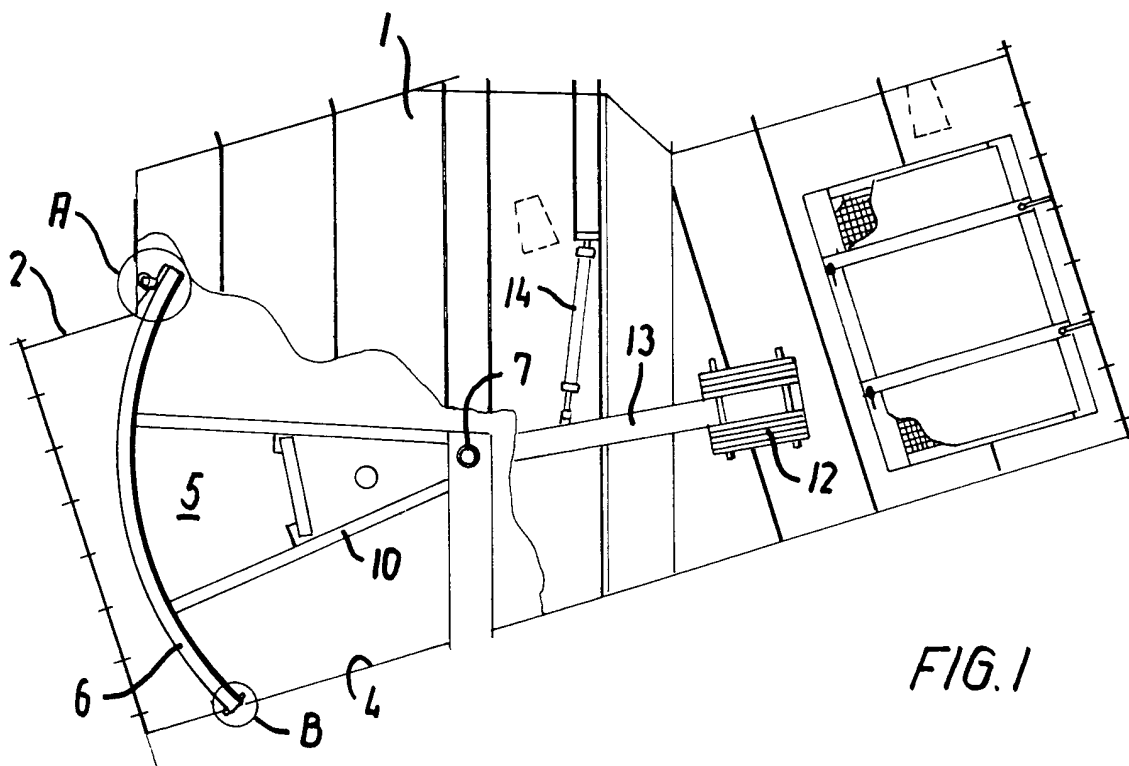


FIG. 1

Description

[0001] The present invention relates to a gate arrangement for the conveying of straw bales along a transport path in a straw firing plant, comprising a housing with a gate opening having a top surface, a bottom surface and two side surfaces as well as a gate member with a top edge, a bottom edge and two side edges, the gate member being movable between an open position and a closed position in which the gate member substantially covers the gate opening, the gate arrangement comprising a tilting gate, the gate member being pivotally connected with said housing in a hinge connection at the side surfaces of the gate opening with a substantially horizontal axis of rotation at right angles to the said transport path.

[0002] Such gate arrangements used, e.g., as lock gates in straw firing plants are conventionally designed as lifting gates, the gate member in the open position being received in the structure located below the transport path, and the top edge of the gate member being located substantially in alignment with the transport path and thus the bottom surface of the gate opening. During closure the gate member is moved upwards through a slot in the bottom surface of the gate opening until the gate member in the closed position covers the entire gate opening, the top edge of the gate member bearing against abutment surfaces at the top surface of the gate opening. Due to the clearance in the slot of the bottom surface of the gate member required for movement of the gate member, there is a risk, during conveying of the straw bales, that gravel, stones and similar elements conveyed into the plant together with the straw bales fall down and are wedged between the gate member and the side walls of the slot, which again means that the gate member cannot or can only with difficulty be lifted to a closed position. As the gate member in the open position is also received in the underlying structure, such gate arrangement becomes extremely bulky.

[0003] For partial alleviation of such disadvantages, a gate arrangement corresponding to the introduction of claim 1 is known.

[0004] The object of the invention is to provide a gate arrangement of the type mentioned in the introduction that ensures a reliable function of the gate arrangement.

[0005] This object is achieved by such gate arrangement which is characterized in that the gate member is shaped like a curved surface.

[0006] By designing the tilting gate of the gate arrangement with a curved gate member, it can be tilted up to assume the open position in a simple manner. The slot in the transport path can possibly be completely omitted, whereby the problem of down-falling elements does not arise, or it can be retained, the elements then being able to fall down for collection further down in the structure without conflicting with the gate member. Moreover, the design has a space-saving function, as the entire structure at the gate arrangement can be

made lower than is the case in existing plants.

[0007] In a preferred embodiment of the invention, the gate member is shaped like a cylinder surface, which is expressed in that the side edge of the gate member is formed as a circular arc. This results in further saving of space, particularly if the hinge connection is placed so that the axis of rotation is located at such distance from the gate member surface as corresponds to the radius of curvature for the said surface.

[0008] To achieve a secure guiding of the gate member during the opening and closing movements and to provide the best sealing possible along the edges of the gate member, sealing members may be arranged in connection with the abutment surfaces of the gate member against the top, bottom and side surfaces of the gate opening for engagement with corresponding members at the gate opening.

[0009] The gate arrangement is preferably operated by means of a compressed-air cylinder, and in a suitable embodiment opening of the gate arrangement is facilitated by a counterbalance device.

[0010] The invention will now be described in more detail below with reference to the schematic drawing, in which

Fig. 1 is a partially sectional side view of a gate arrangement according to the invention,

Fig. 2 is a partially sectional top plan view of the gate arrangement of Fig. 1, and

Figs. 3-5 are details, on a larger scale, corresponding to marks A, B and C, respectively, in the gate arrangement shown in Figs. 1 and 2.

[0011] The gate arrangement shown in the drawing is designed as a tilting gate arranged in a housing 1 with an entry end 2 for straw bales, now shown, conveyed along a transport path that extends through the housing 1 between a storage place, such as a straw barn, and a boiler in a straw firing plant.

[0012] A gate opening with a top surface 3, a bottom surface 4 and two side surfaces 5 is formed in the entry end 2, and in the closed position of the gate arrangement shown the gate opening is substantially covered by a gate member 6 which, at a top edge 6a, a bottom edge 6b and two side edges 6c bears against two abutment surfaces at the top surface 3, the bottom surface 4 and the side surfaces 5, respectively, in the manner described in more detail in the following.

[0013] The gate member 6 is connected with the housing 1 at the side surfaces 5 of the gate opening by means of a hinge connection 7 which, at each side, comprises stub shafts 8 pivotally journaled in bearings 9. Each stub shaft 8 is mounted on one end of an associated arm 10 connected at an opposite end with the gate member 6 so that the hinge connection has an axis of rotation 11 that is substantially horizontal and extends at right angles to the transport path. In the embodiment shown the gate member 6 is shaped like a cylinder sur-

face, the side edge 6c being formed as a circular arc. The arms 10 have a length so that the axis of rotation 11 is located at a distance from the cylinder surface of the gate member corresponding to the radius of the circular arc. Other curved surface shapes are also imaginable.

[0014] At the side of the hinge connection 7 opposite to the gate member 6, the tilting gate has a counterbalance device comprising a counterbalance 12 arranged one on either side of the housing 1 and being built of individual balance members and fastened to one end of a rod member 13 which is connected at the opposite end with the stub shaft 8 of the hinge connection 7.

[0015] For operation of the tilting gate, that is, opening and closure of the gate member 6 in relation to the gate opening 3, 4, 5, one end of a compressed-air cylinder 14 is pivotally connected with fittings, not shown in detail, on either side of the housing 1, and at the opposite end each compressed-air cylinder 14 is also pivotally connected with the rod member 13.

[0016] To achieve secure guiding of the gate member 6 during the opening and closing movements and to provide the best possible seal along the edges 6a, 6b, 6c of the gate member, the gate member 6 has sealing members 15-18 for engagement with corresponding members in the gate opening, as is most clearly shown in Figs. 3-5.

[0017] At the top edge 6a of the gate member 6, the sealing member is formed as a cross-sectionally, substantially L-shaped fitting 15 with a leg projecting downwards along the outer surface of the gate member and, in the closed position of the gate arrangement, overlapping a corresponding leg on a similarly L-shaped fitting 19 in connection with a bracket 22 at the top surface 3 of the gate opening. At the bottom edge 6b, the sealing members are constituted by bent flanges 16, 17, which are fastened to the gate member by means of screws, and which, in the closed position, cooperate with the bottom surface 4 of the gate opening. At the side edges 6c, the gate member 6 is formed with a cross-sectionally, substantially U-shaped profile member 18 with a track cooperating with a rail 21 in connection with the side surface 5 of the gate opening.

said housing (1) in a hinge connection (7) at the side surfaces (5) of the gate opening with a substantially horizontal axis of rotation (11) at right angles to the said transport path, **characterized** in that the gate member (6) is shaped like a curved surface.

2. A gate arrangement according to claim 1, **characterized** in that the said surface is a cylinder surface.
3. A gate arrangement according to claim 1 or 2, **characterized** in that the said hinge connection (7) is placed so that the axis of rotation (11) is located at such distance from the gate member surface (6) as corresponds to the radius of curvature of the said surface.
4. A gate arrangement according to any of the preceding claims, **characterized** in that at its top, bottom and side edges (6a, 6b, 6c) the gate member (6) comprises sealing members (15-18) for engagement with similar members (19, 21) at the top, bottom and side surfaces (3-5) of the gate opening.
5. A gate arrangement according to any one of the preceding claims, **characterized** by comprising a compressed-air cylinder (14) for operation of the gate member (6).
6. A gate arrangement according to any one of the preceding claims, **characterized** by comprising a counterbalance device having two counterweights (12) connected with respective rod members (13) at a distance from the said axis of rotation (11).

Claims

1. A gate arrangement for the conveying of straw bales along a transport path in a straw firing plant, comprising a housing (1) with a gate opening having a top surface (3), a bottom surface (4) and two side surfaces (5) as well as a gate member (6) with a top edge (6a), a bottom edge (6b) and two side edges (6c), the gate member being movable between an open position and a closed position in which the gate member substantially covers the gate opening, the gate arrangement comprising a tilting gate, the gate member (6) being pivotally connected with

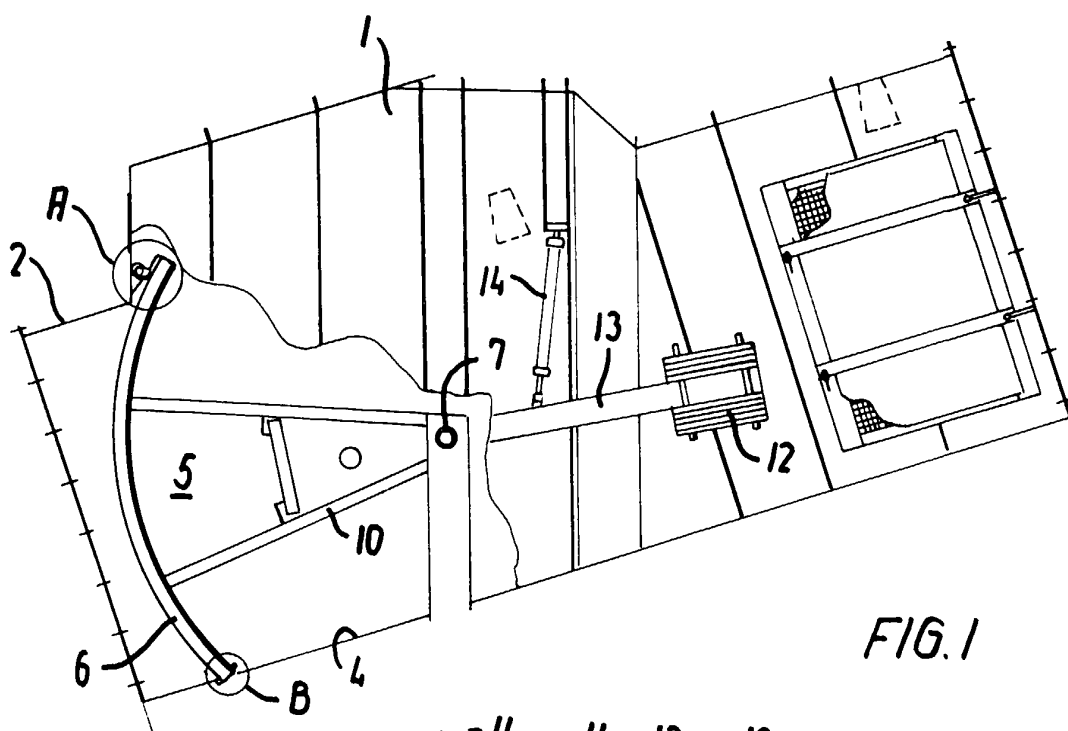


FIG. 1

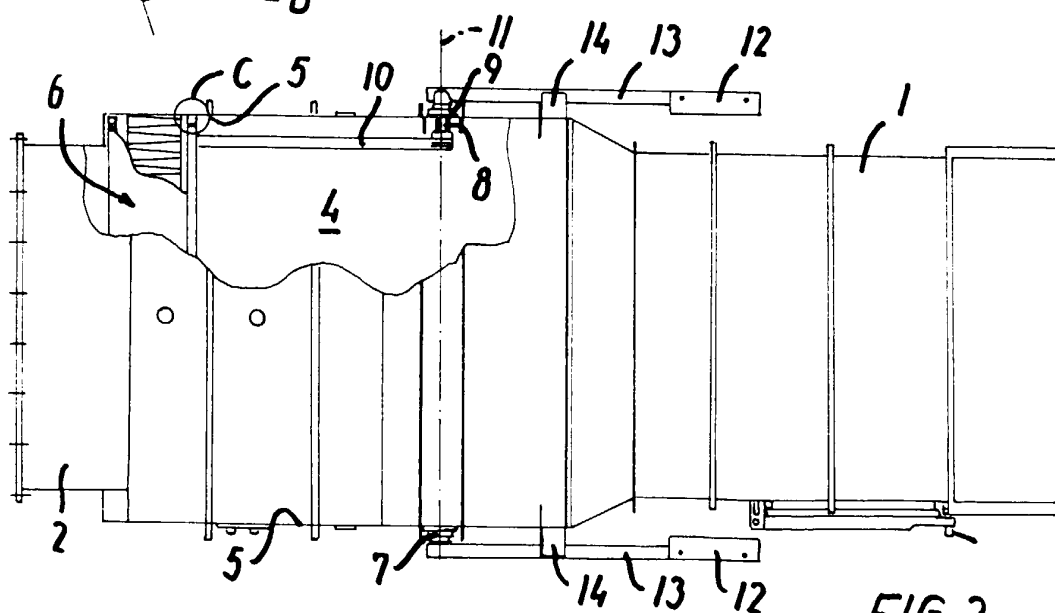


FIG. 2

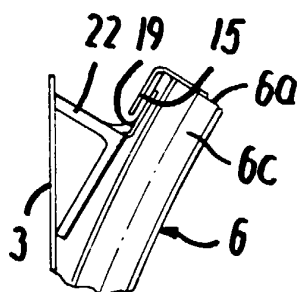


FIG. 3

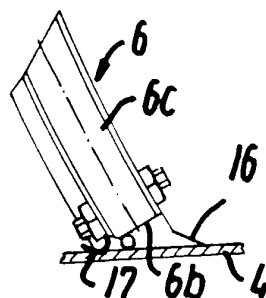


FIG. 4

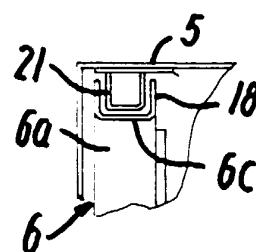


FIG. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 00 61 0067

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 5 October 2000	Examiner Coli, E
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P4/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 61 0067

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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