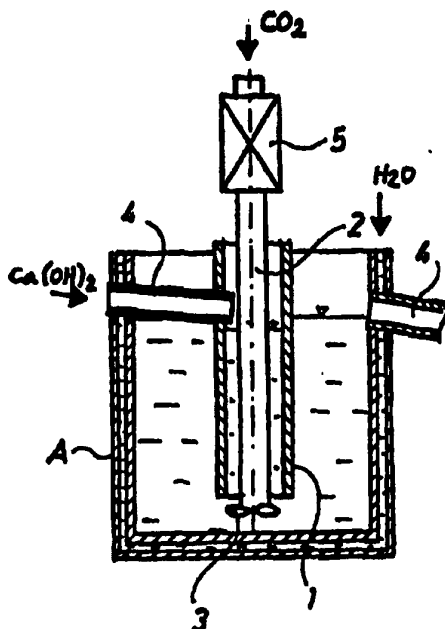




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(54) Title: CONTINUOUS PRECIPITATED CALCIUM CARBONATE PRODUCTION EQUIPMENT



(57) Abstract

The invention refers to the equipment designed for continuous production of precipitated calcium carbonate from low concentration lime milk provided for introduction of flue gases with CO₂ content. The precipitated calcium carbonate production takes place in the equipment referred to in this invention, which consists of a series of reaction cells provided for continuous introduction of flue gases with CO₂ content. The continuous precipitated calcium carbonate production equipment consists of an optional number of interconnected reaction cells where the interior of the preceding cell is an inlet tube connected with the centrally positioned tube of the following cell, which provides for lime suspension flow through the line without requiring any level difference between cells.

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CONTINUOUS PRECIPITATED CALCIUM CARBONATE
PRODUCTION EQUIPMENT

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The invention refers to the equipment designed for continuous
20 production of precipitated calcium carbonate from low concentration lime
milk provided for introduction of flue gases with CO₂ content. The
invention has been classified into C 01F 11/18 class of the International
Patent Classification.

The technical problem successfully solved by the equipment in question involves continuous production of precipitated calcium carbonate according to an environment friendly technological procedure free of any waste production.

5 There have been known calcium carbonate production procedures, such as described in the American patent document US 4,793,985 and/or in the EP document 369 650, which, however, do not allow for continuous calcium carbonate production.

10 The continuous precipitated calcium carbonate production equipment referred to in this invention will be described with reference to the concrete example and the enclosed drawing showing:

Figure 1 Reaction cell cross-section chart

15 The precipitated calcium carbonate production takes place in the equipment referred to in this invention, which consists of a series of reaction cells provided for continuous introduction of flue gases with CO_2 content into the low concentration lime milk.

20 At addition of appropriate quantities of CO_2 to calcium oxide CaO there develops calcium carbonate CaCO_3 in the way that 56 mass particles of crashed calcium oxide CaO are quenched and 18 mass particles of water added to result in 74 mass particles of calcium hydrate Ca(OH)_2 . By the

addition of 44 mass particles of CO_2 we get 100 mass particles of calcium carbonate CaCO_3 plus water.

The Ca(OH)_2 suspension density depends on the desired form of crystals and varies between 100 and 200 g/l.

5 The flue gases introduced into the suspension shall undergo preliminary treatment. Hot gases are preliminarily conducted through a three-level venturi tube which cools the gas down to 40°C and in case of gases containing SO_2 removes the latter as well. At transition of the flue gas through the cells only CO_2 reacts with the suspension, whereas the
10 remainder of the flue gas is released.

The continuous precipitated calcium carbonate production equipment consists of an optional number of interconnected reaction cells where the interior of the preceding cell is inlet tube connected with the centrally positioned tube of the following cell, which provides for lime suspension
15 flow through the line without requiring any level difference between cells.

Each reaction cell may be square in shape; it consists of a vessel A and a centrally positioned tube 1 which contains a hollow shaft 2 of the stirring rod provided for introduction of flue gases into the cell.

Upon introduction of calcium hydroxide Ca(OH)_2 through the inlet tube
20 4 into the first cell of the row and upon the start-up of motors 5 in individual cells, the stirring attachment 3 in the tube 1 creates the negative pressure which causes slight lifting of the suspension level in the cell. Therefore the suspension may flow through the inlet tube 4 of the

next reaction cell into the next reaction cell. The suspension flow process in all subsequent reaction cells of the respective row is identical. Successful performance of the procedure requires 10 to 15 reaction cells.

In the first reaction cell of the row and in each subsequent reaction cell
5 the introduced calcium hydroxide reacts with the CO_2 introduced through the shaft 2 in the way to result in gradual production of CaCO_3 .

The stirring attachment 3, mounted at the lower end of the shaft 2 disperses the flue gases into small bubbles, which produces some large contact surface between the CO_2 from flue gases and the lime
10 suspension. The CO_2 reacts while the bubbles rise to the surface. The partly precipitated suspension flows into the next reaction cell where the above described procedure is repeated.

The last but one cell contains a pH-meter regulating the inflow of fresh lime suspension.

15 All reaction cell walls are cooled. The temperature control in the cells influences the crystalline form from calcite to aragonite. Thereafter the obtained carbonate is thickened in several stages; follows precipitation, pressing on filter presses and drying.

The pigment white is over 95 %, measured with reference to the MgO
20 white (DIN 53145-T2D65); 80 % of crystals are of micrometer size.

The continuous precipitated calcium carbonate production equipment referred to in this invention provides for controlled form and size of calcium carbonate crystals, for 50 % reduction of power consumption in

reaction cells, for universal application of the equipment as well as for its adaptability in view of lot production and simple increase of production capacities.

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PATENT CLAIMS

- 5 1. The continuous precipitated calcium carbonate production equipment,

characterized in that

- 10 the reaction cell consists of a vessel (A), a centrally positioned tube (1) containing a hollow shaft (2) with the motor (5) mounted on one end and the stirring attachment (3) fixed on the other.

- 15 2. The continuous precipitated calcium carbonate production equipment referred to in the claim 1,

characterized in that

- 20 an optional number of reaction cells are interconnected in the way that the vessel (A) of the preceding cell is connected with the centrally positioned tube (1) of the next cell through the inlet tube (4).

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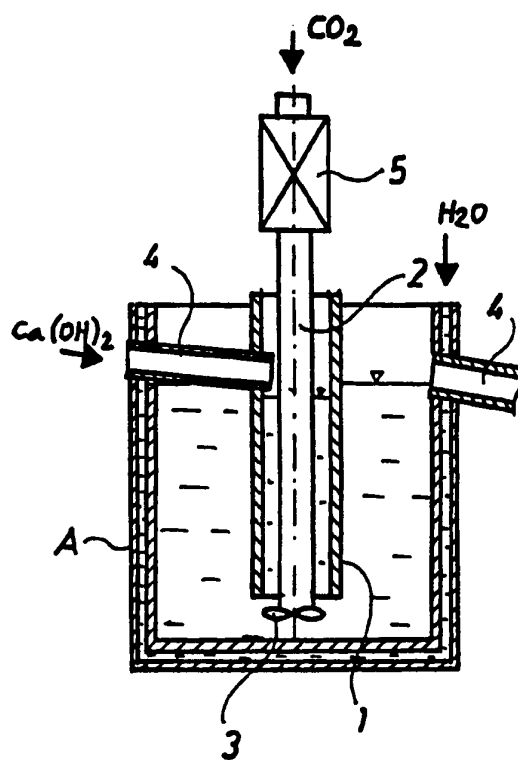


FIG. 1