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(54) Method of and apparatus for reducing the sulphur circulation and/or the SO_2 emission in a plant for burning fine-grained material

(57) A method of reducing the sulphur circulation of SO_2 emission in a plant for burning or roasting fine grained material comprises branching off the process gas from a final burning or roasting stage in dependence on the SO_2 content of the process gas or the SO_3 content of hot meal, mixing said gas with dust and/or raw meal containing one or more sulphur binding substances, (e.g. $MgCO_3$ or $CaCO_3$) which react with the gas in a reaction zone. The gas is cooled by fresh air and/or H_2O and is separated from the sulphur containing solid.

The invention also includes a plant suitable for carrying out this method.

FIG.1

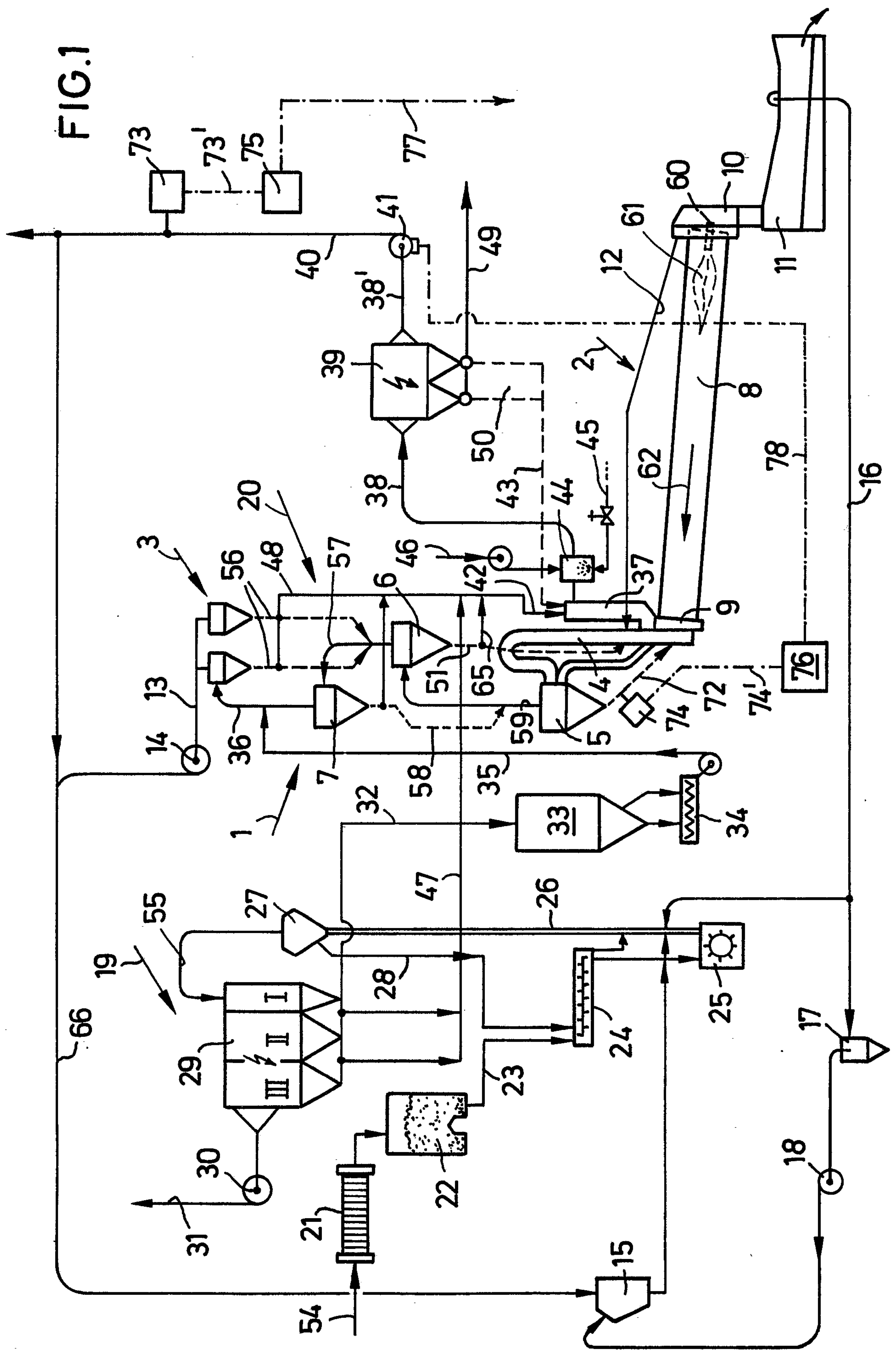
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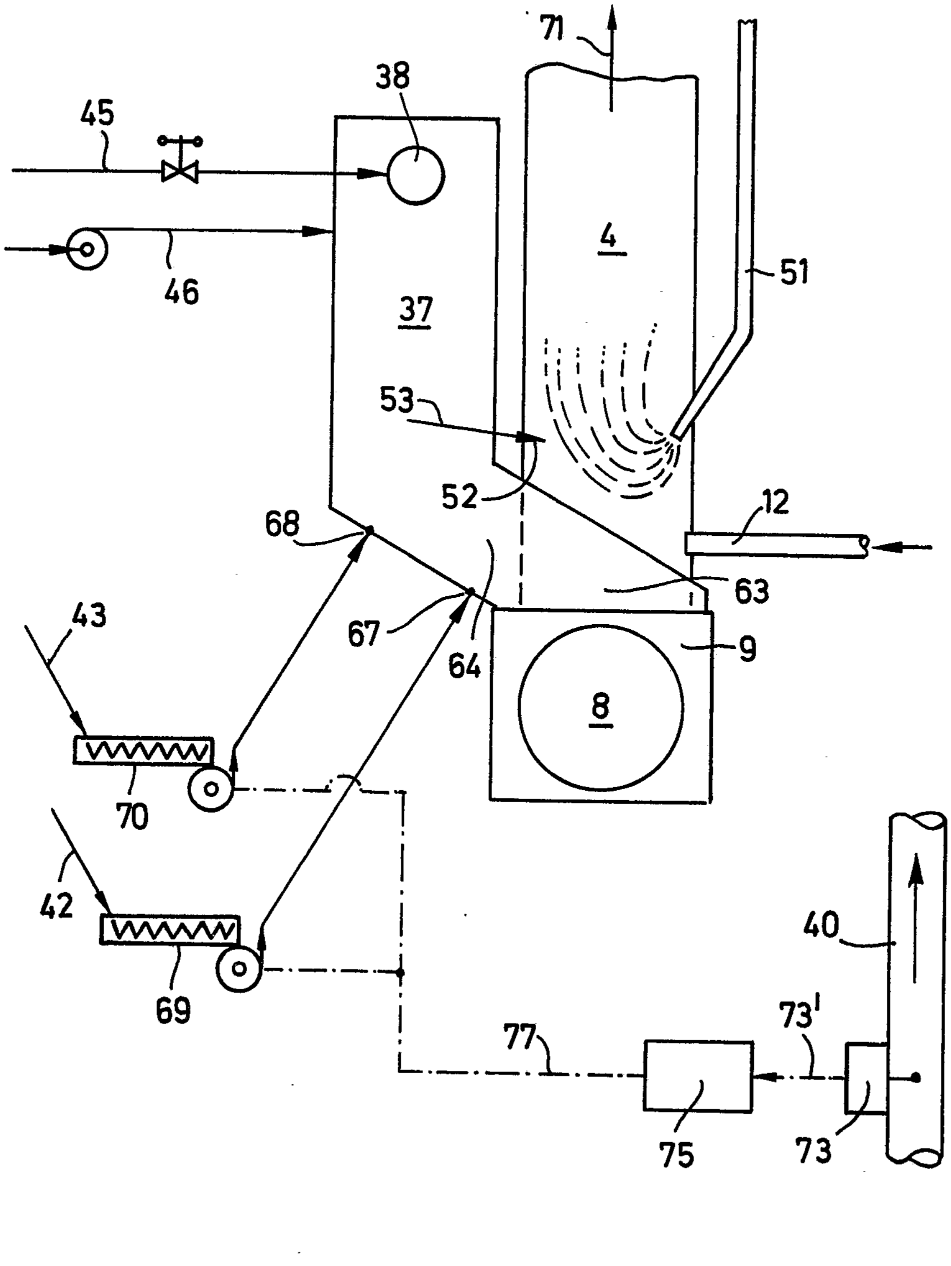
FIG.2



SPECIFICATION

Method of and apparatus for reducing the sulphur circulation and/or the SO_2 emission in a plant for burning fine-grained material

The invention relates to a method of and an apparatus for reducing the sulphur circulation and/or the SO_2 emission in a plant for burning or roasting fine-grained material, particularly raw cement meal, comprising a preheating and preliminary burning stage and a final burning stage with a sintering zone.

The development of harmful concentrations of substances in circuits of plants for material conversion is known. Particularly in burning plants for cement, concentrations of alkalis or sulphur frequently occur in the corresponding material circuits and not infrequently lead to the formation of harmful deposits.

Sulphur occurs, for example, in sulphidic or sulphatic compounds of the raw meal containing calcium carbonate which is burnt as the burned product in the so-called normal process in burning plants operated in an energy-saving manner, with suspension type preheaters and rotary kilns to form cement clinker. As a result of the temperatures which occur in the course of this, for example about 1,400°C in the clinker zone, sulphur compounds are dissociated, releasing SO_2 in the process gas. Further amounts of SO_2 are released when using fuels containing sulphur.

Sulphur dioxide, concentrated in this manner in the hot gases of the burning plant, reacts with alkalis and alkaline earths contained in the raw meal to form alkali sulphates. For example, a conversion of the potassium oxide resulting primarily from the silicatic compounds of the minerals of the raw meal in the presence of sulphur dioxide is effected according to the formula:

$$K_2O+SO_2+1/2\ O_2=K_2SO_4$$

forming potassium sulphate. Since this has a very low vapour pressure, like other alkali sulphates, these are mainly extracted from the burning plant with the clinker.

A concentration of sulphur dioxide going beyond the quantitative conversion and not converted into sulphates by the alkalis or alkaline earths, reacts with lime components deacidified from calcium carbonate to calcium oxide to form calcium sulphate or gypsum. The corresponding reaction takes place, according to the equilibrium conditions depending on the temperature, according to the equation:

$$(T<1{,}000°C)\rightarrow$$

$$(T<1{,}000°C)\leftarrow$$

$$4\ CaO+4\ SO_2\rightleftharpoons 3\ CaSO_4+CaS$$

In contrast to alkaline earth sulphates, however, calcium sulphate is not stable at temperatures above 1,000°C but dissociates in the clinker zone to CaO and SO_2 at about 1,400°C. The sulphur dioxide released in the course of this greatly enriches the gases of the burning plant and so forms the cause for the development of sulphur circulation.

(Walter H. Duda, Zement-Data-Book, 2nd edition, 1977, Bauverlag GmbH, Wiesbaden and Berlin; McDonald and Evans, London, page 6, 1.4.3: Schwefel; special reprint from the journal "Zement-Kalk-Gips" (ZKG), Bauverlag GmbH, Wiesbaden 1960, pages 36 to 44; Weber "Wärmevorgänge im Drehofen unter Berücksichtigung der Kreislaufvorgänge under Phasenbildung").

A balanced sulphur economy within a burning plant, wherein entry of sulphur from raw meal and fuel and exit through clinker, dust and permissible concentration of the waste gas are in equilibrium, can only be achieved with difficulty with the large number of component influences at the raw material side and because of the large number of variable parameters determining the reactions.

In this, the development of internal dust circulation also plays a part, as a result of which the meal circulation for example in the lowest heat exchanger stage may reach 1.5 to 2 times the amount of meal feed.

In some circumstances, dust and material circulation may mutually stimulate one another if the flow originally provided is disturbed by deposits or damage to the brickwork, particularly in the region of the meal inlet paths, and displacements in the temperature zones provided also occur.

In this case, circulation phenomena can, as is known lead to exceptionally high concentrations of corresponding compounds at individual points in the burning system, even when these compounds are only contained in small amounts in the raw material or in the fuel.

In the case of sulphur, this likewise leads to concentrations in the circulation, according to the circulation well known from alkali chlorides with the consequence of unwanted formations of deposits caused by eutectica in the range from 800 to 1,000°C inside the suspension type heat exchanger. In consequence, reductions in the output of a plant result at the point of disturbances in operation. If, in the course of this, a concentration of SO_2 in the gas stream of the suspension type heat exchanger is exceeded which cannot be decomposed to an adequate extent by sulphate binding of the sulphur on the raw meal components, the SO_2 emission of the waste gas of the plant increases far above the permissible limits of 200/250 ppm, for example, up to 1000/1500 ppm.

The invention seeks to make available a method and an apparatus for reducing the sulphur circulation and/or the SO_2 emission in a plant for burning fine-grained material, in particular in order to prevent the causes for the development of harmful concentrations in the circulation of the sulphur inside the plant and an SO_2 break-through in the waste gas of the plant.

According to a first aspect of the invention, there is provided a method of reducing the sulphur circulation and/or SO_2 emission in a plant for burning or roasting fine grained material, which plant comprises a preheating and/or preliminary burning or roasting stage and a final burning or roasting stage wherein process gas is branched off from the final burning or roasting stage in dependence on the SO_2 content of the process gas and/or the SO_3 content of the hot meal, the branched off gas is mixed with dust and/or raw meal containing one or more sulphur binding substances and is caused to react in a reaction zone, the branched off gas is cooled by the addition of fresh air and/or H_2O, and is separated from the sulphur containing solid, and the resulting gas and solid are drawn off.

As a result of the fact that a component stream of hot process gas highly enriched with sulphur dioxide is branched off on emerging from the final burning stage, depending on the concentration, and caused to react with dust containing carbonate and is removed from the burning plant, it is possible, in a very advantageous manner to reduce the sulphur component in the gas stream and/or stream of material of the plant by this uncomplicated measure and thus to regulate the equilibrium in the sulphur economy so that the development of harmful sulphur circulation with the consequence of the formation of deposits and/or excessively high waste gas concentrations of SO_2 are kept under control.

In the course of this, it may be very advantageously provided, particularly with regard to the economy of the method, that dust accumulating in the plant and/or preheated raw meal obtained in the preliminary burning stage is used to bind the sulphur.

In the course of this, use is intentionally made of the knowledge that finely dispersed dusts, which are collected for example, in a dust separator of the plant, offer considerably larger absorption surfaces in comparison with normally ground raw meal, as a result of which reactions with sulphur are achieved with relatively high efficiency.

The reaction may be carried out while increasing the dwell time in the reaction zone.

This may be achieved, in an uncomplicated manner, for example, if fine dust accumulating during the separation of desulphurized process gas and solid containing sulphur is at least partially recirculated in the reaction zone. As a result, with an extended dwell time and multiple contact, components which have not yet completely reacted are given the possibility of a completely or almost completely thorough reaction. Thus the effectiveness of the reaction result is improved with the advantageous consequence that only such an amount of dust and/or raw meal is needed for binding the sulphur as corresponds approximately to the stoichiometric relationship.

Multi-chamber electrostatic filters may be used to separate dust out of the gas circuit of the plant and fine dust with a grain spectrum between 0 and 40 μm, preferably between 5 and 20 μm, accumulating preferably in the second and/or in the third chamber may be used to bind the sulphur.

And finally, in order to intensify the reaction, it may be advantageously carried out in a temperature range from about 500 to 1,000°C and the process gas may be cooled to a temperature range amounting to a maximum of about 400°C for the dust separation.

Altogether, optimum conditions result through the mutually favourable cooperation of the measures provided for the binding of SO_2 on dust and/or raw meal. The calcium oxide or magnesium oxide primarily resulting in the reaction chain surprisingly offers above-average favourable prerequisites for conversion with sulphur with its valencies becoming free in statu nascendi. Maximum efficiencies of conversion can be achieved which go far beyond the extent which could be expected. The expenditure on dust material and raw meal for the absorption of sulphur is reduced to a minimum in a very advantageous manner. The proportionate transport and dumping costs are therefore correspondingly low in an advantageous manner.

The desulphurized process gas may be supplied as drying gas to the drier of a part of the plant associated with the burning plant, for preparing and drying the feed material.

If it were desired to use the waste gases of the plant without the extraction of excess sulphur from the waste gas of the final burning plant, in a flow drier, then in this way a harmful enrichment of the sulphur circulation via the drying circuit would be inevitable. In the event of a dilution of the waste gas with fresh air for example, valuable thermal energy would be lost and the capacity of the dust-collecting installation would have to be increased. Thus the investment and operating costs as well as the power requirements of the exhaust group, would increase considerably to the disadvantage of the total operating costs.

Through use of the invention in a burning-installation/drier plant unit, the prerequisite for the development of harmful circulations of sulphur inside the streams of gas and/or material is inhibited. This measure is consequently of the greatest advantage to a particular extent because, through it, a far-reaching recovery of the thermal energy contained in the gas circuit is first rendered possible by drying and preheating the feed material without the disadvantageous consequence of excessive SO_2 and/or SO_3 concentrations.

In order to increase the thermodynamic efficiency of the reaction between calcium compounds and/or magnesium compounds with sulphur dioxide, an activating active substance may very advantageously be introduced into the reaction zone—as is known—either in powder form or in solution with water by injection.

According to a second aspect of the invention, there is provided a plant for burning or roasting fine grain material comprising a preheating and/or preliminary burning stage and a final burning stage, wherein the plant also comprises branching means for branching off the process gas from the final burning or roasting stage in dependence on the SO_2 content of the process gas and/or the SO_3 content of the hot meal, the mixing means for mixing the branched off gas with dust and/or raw meal containing suphur bonding substances, a reacton zone for the mixed gas and dust and/or meal, means for cooling the branched off gas, and means for separating the gas and the sulphur containing solid.

The plant may comprise at least one suspension type heat exchanger with a dust separator at the waste gas side an a rotary kiln, a chamber connected to the kiln inlet head of a rotary kiln with at least one device for the supply of and for the measured feed of dust and/or raw meal into the chamber, a waste-gas pipe connected to the chamber, means for introducing fresh air and/or H_2O in the region of the chamber and/or of the waste-gas pipe, an electrostatic filter installation in the waste-gas pipe, a suction fan following the waste-gas pipe, the flow of which can be regulated, and conveyor devices for supplying dust and/or raw meal from the place where it is produced to the feed device.

The expenditure on apparatus provided by the invention is obviously relatively low, particularly when it is a question of a relatively small volume of branched off process gas, depending on the contents of SO_2 and/or SO_3 in the stream of gas and/or material of the plant. Accordingly, correspondingly small dimensions and correspondingly favourable costs result both for the chamber and for the waste-gas pipe as well as for the electrostatic filter disposed therein and the suction fan.

In a burning plant with a flow drier for the feed material connected to the gas pipe of the suspension type heat exchanger and a gas cleaning means associated with this at the waste gas side, preferably an electrostatic gas cleaning means, the plant may also have a device for conveying dust from the gas cleaning means to the chamber and the gas pipe connected to the chamber may be connected to the gas pipe leading from the suspension type heat exchanger to the flow drier.

As a result of this construction of a burning plant combination of the above type, the possibility is very advantageously afforded of economically using the amounts of waste heat contained in the gas circuit of the plant for the heating of raw materials or for their drying, and hence of utilizing the available energy potential as far as possible without harmful sulphur circulation developing inside the plant or excessive SO_2 concentrations being present in the waste gas.

A very advantageous and uncomplicated regulation of the amount of process gas to be branched off depending on the SO_3 concentration in the hot meal or of the amount of dust and/or raw meal depending on the SO_2 content in the process gas may be achieved. A device for measuring the SO_2 concentration in the gas may be disposed in the region of the waste-gas pipe connected to the chamber and a device for measuring the SO_3 content may be disposed in the region of the down pipe for the hot meal from the lowest cyclone to the kiln inlet. These measuring devices may be connected through signal lines to regulating devices which, cooperating with the means for measuring the amount of dust or raw meal or with the regulable suction fan form a control loop.

As a result of this arrangement of regulating devices, the sulphur content in the stream of gas and/or material of the plant may be kept at a constant level, and on the other hand, only so much process gas and/or the dust or raw meal may be drawn off at a time for binding of the sulphur as is made necessary to master the equilibrium in the sulphur economy of the plant.

The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:—

Figure 1 is a block circuit diagram of a burning plant with a device for carrying out the method according to the invention, and

Figure 2 shows a rotary-kiln inlet chamber with the reaction chamber connected thereto, likewise illustrated purely diagrammatically.

The cement burning plant in Figure 1 comprises the preheating and preliminary burning stage 1, the final burning stage 2 and a cyclone dust-separator group 3. The preheating and preliminary burning stage 1 in turn comprises a reaction section 4 for calcining the heated raw meal and three heat exchange cyclones 5, 6 and 7 following in the gas stream. The final burning stage 2 comprises the rotary kiln 8 with the kiln inlet head 9, the kiln discharges chute 10 and the cooler 11. A tertiary air line 12 conveys hot cooler air in known manner, by-passing the rotary kiln 8, directly into the reaction section 4. A waste-gas pipe 13 with a suction fan 14 disposed therein leads from the cyclone group 3 to a mixing chamber 15 into which a line 16 leads, branched off from a central chamber of the cooler 11. This line conveys preheated fresh air via a separator 17 and a pressure-increasing blower 18, into the mixing chamber 15.

Connected to the burning plant 20 is a plant 19 for preparing the raw meal provided for the burning plant 20. This comprises a dewatering filter 21, an intermediate bunker 22, a conveyor device 23 with the pug-mill mixer 24, a comminuting device 25, a flow drier 26 with a separator 27 and a grit return pipe 28, as well as electrostatic gas cleaning plant 26 with a suction fan 30 and a waste-gas pipe 31. Finished material collecting in the gas cleaning plant 29 is supplied by a conveyor device 32 to a storage silo 33 and from this to the burning plant 20 via a Fuller-Kinyon pump 34 and a pipe 35 in a connecting line 36 between the heat exchanger cyclone 7 and the cyclone dust separator group 3.

In the burning plant 20, a chamber 37 forming the reaction zone with a waste-gas pipe 38, an electrostatic gas cleaning means 39 disposed therein and a suction fan 41 disposed in the waste-gas stream 38′ leading to a pipe 40 for the desulphurized waste gas are provided. Also belonging to the chamber 37, as integrating components are devices 42 and 43 for conveying and feeding dust collecting in the gas cleaning installations 29, 39 and possibly in the cyclone group 3 or raw meal into the chamber 37, and furthermore a gas conditioning means 44 with a device 45 for injecting water and a device 46 for supplying fresh air. Furthermore, a conveyor device 47 is provided, through which dust preferably collecting in the chambers II and III of the multichamber electrostatic gas cleaning installation 29, is conveyed to the feed device 42. A branch 48 from the raw meal discharge of the heat exchanger cyclone group 3 with a connection to the device 43 serves the same purpose for conveying and feeding into the chamber 37. The discharge of the dust containing sulphate separated out of the branched off process gas by the electrostatic gas cleaning means 39 is effected by the conveyor device 49. A branch 50 from this serves for the recirculation of separated dust and feed back into the chamber 37 via the device 43.

A measuring device 73, is provided in the pipe 40 to measure the SO_2 content of the desulphurized waste gas.

This measuring device transmits the measured value via a signal line 73′ to a regulating device 75. This compares the measured value, as is known, with a desired value which is fed in and if there is a difference, calculates from it a control pulse which is transmitted by a control line 77 to the means provided for the measured feed of dust and/or raw meal into the chamber 37, namely Fuller-Kinyon pumps 69 and 70. In order to measure the SO_3 content in the hot meal, a measuring device 74 is provided in a pipe 72 leading from the lowest heat exchanger cyclone 5 to the kiln inlet head 9. This measuring device transmits the measured value via a signal line 74′ to the regulating device 76. This compares the measured value, likewise as is known, with a desired value which is fed in and, depending on the difference, calculates a regulating pulse which is transmitted through a control line 78 to the suction fan 41 whose through flow can be regulated. In this manner, control loops are established by simple means, which control loops regulates both the branching off of the process gas and the supply of dust and/or preheated raw meal depending on the sulphur content of the stream of gas or material of the plant and so keep the equilibrium of the sulphur content constant.

The arrangement of the chamber 37 can be seen in more detail from Figure 2. This shows the rotary kiln 8, the kiln inlet head 9 and following on that, the reaction section 4 through which the hot process gas flows in the direction of the arrow 71. Heated raw meal from the lowest suspension type heat cyclone exchanger 6 is introduced into the reaction section, as is known, substantially opposite to and at the same height, in the down pipe 51, while fuel is fed in at an opposite point 52, indicated by the arrow 53. Connected to the kiln inlet head 9, at the gas side, is the chamber 37 with the waste-gas pipe 38; connections 67 and 68 of feed devices 42 and 43 also lead into the chamber 37. These feed devices are equipped with Fuller-Kinyon pumps 69, 70 feeding measured amounts. Furthermore a water injecting device 45 provided for the gas conditioning means 44 and a device 46 for the supply of fresh air are indicated diagrammatically. Part of the gas pipe 40 shows the SO_2 measuring device 73 connected via a signal line 73′, to the regulating device 75. The device 75 has a control line 77 which is connected to the two Fuller-Kinyon pumps 69 and 70 for the purpose of regulating their throughflow.

For the operation of the plant complex consisting of the plant 19 for preparing raw meal and the burning plant 20, a measured mixture of raw material in the form of slurry, indicated by the arrow 54, is supplied to the dewatering device 21 and after dewatering is stored in the intermediate bunker 22. Dewatered material is withdrawn from the intermediate bunker 22 and fed to a pug-mill mixer 24 by the conveyor device 23. In the mixer, the still moist material is mixed with grit separated in the separator 27 and supplied by the pipe 28 and is mixed by the pug-mill mixer 24 into a crumbly composition. This is fed to the flow drier 26, or a comminuting and preparation unit 25 integrated therewith, which largely loosens and opens up the crumbly agglomerate. The material, thus preliminary treated, is further opened up in the rising air stream of the flow drier 26 and in the course of this is dried and separated into meal and grit in the separator 27. Finished material passes in a warm stream of air through the pipe 55 into the electrostatic gas cleaning installation 29 and, in this about 90% is deposited as raw meal in the chamber I and discharged by the pipe 32 into the raw meal silo 33. From there, raw meal passes through the Fuller-Kinyon pump 34 and the conveyor pipe 35 into the preheating and preliminary burning stage 1 of the burning plant 20, namely into the connecting pipe 36 between the heat exchanger cyclone 7 and the cyclone dust separator group 3. In this, the raw meal is preheated and introduced by the down pipes 56 into the connecting pipe 57 between the heat exchanger cyclones 6 and 7. The material is further heated in the heat exchanger cyclone 7 and introduced by the down pipe 58 into the connecting pipe 59 between the heat exchanger cyclones 5 and 6. The further preheated raw meal is finally deposited by the heat exchanger cyclone 6 and introduced through the down pipe 51 into the reaction section 4 in which it is calcined in known manner with the supply of fuel. Calcined raw meal is introduced into the rotary kiln 8 through the kiln inlet head 9 counter to the stream of gas and is there burnt to clinker by a further supply of heat up to 1,450°C. The hot gas produced by the flame 61 of the burner 60 is countercurrent to the raw meal flows in the direction of the arrow 62 to the kiln inlet head 9, surrendering heat to the material being burned and then into the reaction section 4 and on into the pre-heating and preliminary burning stage 1. In the course of this, a volume of gas provided depending on the regulating device 74, 74′, 76, 78 is drawn in per unit of time by the variable flow suction fan 41 and extracted from the chamber 37 through the waste-gas pipe 38′, the electrostatic gas cleaning means 39, the waste-gas pipe 38, via the gas conditioning means 44. A corresponding amount of gas flows through the connection region 63 of the chamber 37 out of the kiln inlet head 9 and reaches the lower region 64 of the chamber 37 with a temperature range between about 1,000 and 1,300°C prevailing in the kiln inlet head. In the region 64, the branched off gas is mixed according to the invention by the supply of dust and/or raw meal, and a temperature favourable for the intended reaction for binding the sulphur develops. The conveying and feeding of dust and/or raw meal is effected by the devices 42 and 43 via the conveyor devices 47 and 48 and with the aid of the variable amount Fuller-Kinyon pumps 69 and 70 depending on the control instruction of the regulating device 75 over the control line 77.

Fine and very fine dust in the range between 5 and 20 is withdrawn from the chambers II and III of the electrostatic gas cleaning installation 29 by the conveyor device 47 and fed into the chamber 37 in the manner described previously. The temperature of the dust material fed in amounts to about 100°C. A small amount of raw meal may possibly be added by the branch 48 from the cyclone group 3. In case an addition of warmer raw meal should be necessary, a branch 65 is provided with which raw meal at about 700°C can be supplied from the down pipe 51 to the conveying and feed device 42. Fine dust recirculated from the electrostatic gas cleaning means 39 through the pipes 50 and 43 may possibly be added to the mixture of raw meal and dust in the chamber 37. The greater part of the fine dust in a cement plant, particularly that from the electrostatic gas cleaning installation 29 contains essentially calcium carbonate and possibly magnesium carbonate. These are at least partially deacidified in the chamber 37 and possibly also in the waste-gas pipe 38, at temperatures between 500 and 1,000°C, CO_2 being dissociated and SO_2 bonded. As stated, the reaction may also continue in the waste-gas pipe 38 as a result of which the process gas is desulphurized to a large extent. This passes, with components of sulphates in fine-grained form, through the pipe 38 into the electrostatic gas cleaning device 39 in which the desulphurized process gas is separated as waste gas from the solid. The waste gas passes via the waste-gas pipe 38′ and the suction fan 41 into the waste-gas pipe 40 and from this is conveyed back, via the pipe 66, into the heat cycle of the flow drier 26.

In the burning plant 20, the process gas derived from the kiln inlet head 9 by the chamber 37 is replaced in the reaction section by air from the cooler 11 which is heated to about 1,000°C and which is supplied through the tertiary air line 12 bridging the rotary kiln 8.

As a result of this, the concentration of sulphur dioxide drops in the region of the reaction section 4. In this manner, the development of harmful sulphur circulation is prevented—as fully described previously.

The plant shown and described is only to be taken as an example.

For example, the locations for SO_2 and/or SO_3 measurements may be arranged elsewhere. The regulating and control members may also be altered in a logical manner. Instead of the conveyor and feed members, any other devices with a similar function may be used. And finally the control and arrangement of the main parts of the plant such as suspension type preheater, its equipment with cyclones, number of gas cleaning devices etc. is only indicated symbolically and is not decisive for the invention.

Claims

1. A method of reducing the sulphur circulation and/or SO_2 emission in a plant for burning or roasting fine grained material which plant comprises a preheating and/or preliminary burning or roasting stage and a final burning or roasting stage wherein process gas is branched off from the final burning or roasting stage in dependence on the SO_2 content of the process gas and/or the SO_3 content of the hot meal, the branched off gas is mixed with dust and/or raw meal containing one or more sulphur binding substance and is caused to react in a reaction zone, the branched off gas is cooled by the addition of fresh air and/or H_2O, and is separated from the sulphur containing solid, and the resulting gas and solid are drawn off.

2. A method as claimed in claim 1, wherein calcium carbonated and/or magnezium carbonate is used to bind the sulphur.

3. A method as claimed in claim 1 or 2, wherein dust produced in the plant and/or preheated raw meal produced in the preheating stage is used to bind the sulphur.

4. A method as claimed in any one of claims 1 to 3, wherein the reaction is carried out while increasing the dwell time in the reaction zone.

5. A method as claimed in any one of the preceding claims, wherein fine dust produced during the separation of desulphurized process gas and solid containing sulphur is at least partially recirculated in the reaction zone.

6. A method as claimed in any one of the claims 1 to 4, wherein multi-chamber electrostatic filters are used to separate dust out of the gas circuit of the plant, and wherein fine

dust with a grain spectrum between 0 and 40μ, is used for binding the sulphur.

7. A method as claimed in claim 6, wherein the fine dust has a grain spectrum between 5 and 20 μ.

8. A method as claimed in claim 6 or 7, wherein the dust is produced in the second or third chamber of the electrostatic filters.

9. A method as claimed in any one of claims 1 to 8, wherein the reaction of sulphur dioxide with the sulphur-binding substances is carried out in a temperature range from about 500 to 1000°C and the process gas is cooled to a temperature range amounting to a maximum of about 400°C for the separation of the dust.

10. A method as claimed in any one of claims 1 to 9, wherein desulphurized process gas is supplied as drying gas to the drier of a plant section associated with the burning plant for the preparation and drying of the feed material.

11. A plant for burning or roasting fine grain material comprising a preheating and/or preliminary burning stage and a final burning stage, wherein the plant also comprises branching means for branching off the process gas from the final burning or roasting stage in dependence on the SO_2 content of the process gas and/or SO_3 content of the hot meal, mixing means for mixing the branched off gas with dust and/or raw meal containing sulphur binding substances, a reaction zone for the mixed gas and dust and/or meal, means for cooling the branched off gas, and means for separating the gas and the sulphur containing solid.

12. A plant as claimed in claim 11, which comprises at least one suspension type heat exchanger with a dust separator at the waste-gas side and one rotary kiln, a chamber connected in the region of the kiln inlet head of the rotary kiln with at least one device for the supply of and for the measured feed of dust and/or raw meal, a waste-gas pipe connected to the chamber, means provided in the region of the chamber and/or of the waste-gas for the introduction of fresh air and/or H_2O, and a gas cleaning means in the waste-gas pipe, a pipeline therefrom a suction fan connected to the waste-gas pipe a further gas pipe and conveyor devices for supplying dust and/or raw meal from the site of production to the feed device.

13. A plant as claimed in claim 12 wherein the gas cleaning means comprises an electrostatic filter installation.

14. A plant as claimed in claim 12 or 13, wherein the volume of the suction fan is controllable.

15. A plant as claimed in claim 12, 13 or 14, wherein by a drier for the feed material is connected to the waste-gas pipe of the suspension type heat exchanger, and a gas cleaning means is associated with this, and a device is provided for conveying dust from the gas cleaning means to the chamber and the gas pipe is connected to the waste-gas pipe of the suspension type heat exchanger.

16. A plant as claimed in claim 15, wherein the drier is a flow drier.

17. A plant as claimed in claim 15 or 16, wherein the cleaning means associated with the suspension type heat exchanger is an electrostatic gas cleaning means.

18. A plant as claimed in any one of the claims 12 to 17, wherein a device for measuring the SO_2 concentration in the gas is disposed in the region of the said further gas pipe and a device for measuring the SO_3 content in the hot meal is disposed in the region of a hot meal pipe, and wherein these measuring devices are connected, through signal lines, to regulating devices which, cooperating with the means for determining the amount of dust or raw meal or with the suction fan the volume of which can be controlled, through control lines form a control loop.

19. A method of reducing the sulphur circulation and/or SO_2 emission a plant for burning or roasting fine grained material substantially as described herein with reference to the drawings.

20. A plant for burning or roasting fine grain material substantially as described herein with reference to the drawings.

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