

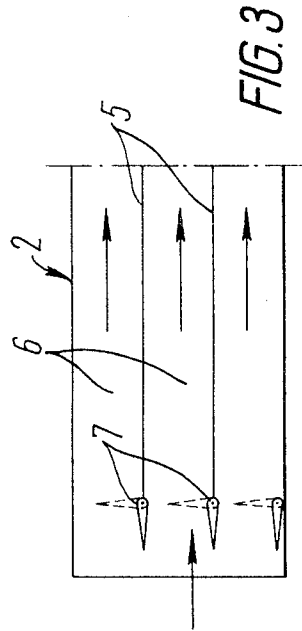
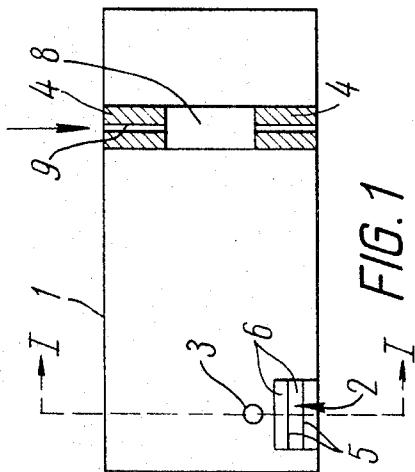
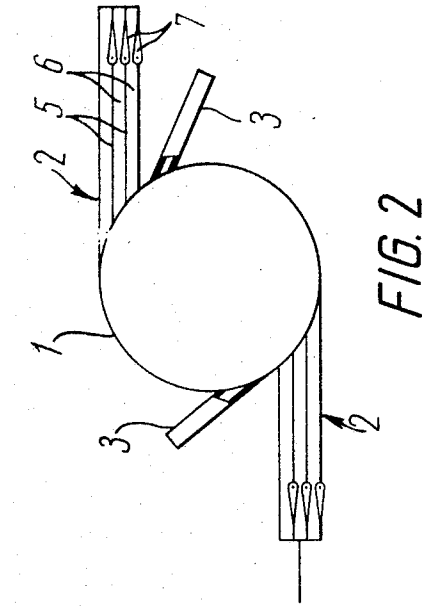
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FURNACE FOR OBTAINING SULPHUR DIOXIDE

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FURNACE FOR OBTAINING SULPHUR DIOXIDE
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5 Claims

ABSTRACT OF THE DISCLOSURE

A cyclone-type sulphur furnace employed in the production of sulphuric acid comprises a cylindrical combustion chamber with nozzles for feeding primary air installed tangentially to the combustion chamber, the nozzles being partitioned lengthwise, thus allowing partial regulation of air supply to the chamber. The chamber also has tangential sprayers for sulfur-containing material and a diaphragm provided with radial channels through which secondary air is fed.

The present invention relates to furnaces for obtaining sulfur dioxide, which are employed mainly in the chemical industry for obtaining sulfur dioxide used in the manufacture of sulfuric acid.

There are known furnaces for obtaining sulfur dioxide, wherein sulfur is burnt in an air flow.

Mainly used at present are sprayer furnaces fashioned as cylindrical chamber in which sulfur is burnt with the aid of registers burner devices.

The heat-release rate of such a furnace is from 50 to $100 \cdot 10^3$ Kcal./cu. m. hr. (cf. Sulfuric Acid Specialist's Manual, edited by Professor K. M. Malin, Moscow, 1952).

In more developed installations, such as those manufactured by the Celleco Co., air is introduced via nozzles, while at the furnace outlet there is placed an afterburning device with a catalyst. The heat-release rate is increased to $1 \cdot 10^6$ Kcal./cu. m. hr.

A disadvantage of the above-described furnaces is that for completing the process of combustion a large-size chamber is required, while operation at partial loads has an adverse effect upon the process of mixing.

Since the technological conditions do not permit underburning in the whole range of operating loads and the operation of the installations is economically feasible at the minimum aerodynamic resistance, the furnaces are made of large dimensions and are usually used for operation with an increased amount of excess air.

Among other disadvantages of the known furnaces are: a great accumulating power, which increases the time required for starting the furnace; high cost of repairs; automation difficulties due to thermal inertia; as well as

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an increased corrosion activity of combustion products due to the emergence of considerable amounts of SO_3 .

The present invention is aimed at developing a furnace for obtaining sulfur dioxide, said furnace featuring high heat-release rates and insuring complete burning of sulfur-containing materials within a wide range of operating loads at the minimum amount of excess air.

In the accomplishment of the above and other objects, the present invention consists in that tangential nozzles for the delivery of air used in the furnace for obtaining sulfur dioxide, according to the present invention, have at least one longitudinal partition and a register closing one of the nozzle channels.

It is feasible that the register be made turnable and placed in the inlet part of the nozzle. It is also feasible that in the furnace for burning sulfur-containing materials there be installed a diaphragm having, in its plane, channels for the additional delivery of the flow of air.

Other objects and advantages of the present invention will be made apparent upon considering the following description thereof and the appended drawings, wherein:

FIG. 1 is a side cross-sectional view of the furnace for obtaining sulfur dioxide, according to the present invention;

FIG. 2 is a sectional view taken on line I—I of FIG. 1; and

Fig. 3 shows a tangential nozzle with longitudinal partitions and channels on enlarged scale and in cross-section.

When describing the exemplary embodiment of the present invention, concrete narrow terminology has been used for the sake of clarity. However, the invention is not limited by the terms adopted, and it should be borne in mind that each of these terms embraces all the equivalent elements working analogously and used to solve similar problems.

A furnace for obtaining sulfur dioxide, according to the present invention, consists of a cylindrical combustion chamber 1 (FIG. 1), tangential nozzles 2, sprayers 3 and a diaphragm 4.

The tangential nozzles 2 are arranged along the perimeter of the cylindrical combustion chamber 1, in its forepart.

Shown in the drawings are two tangential nozzles 2 designed for delivering air to the cylindrical combustion chamber 1, however, there may be additional said nozzles.

The tangential nozzles 2 are divided by longitudinal partitions 5 (FIGS. 2 and 3) into a number of channels 6.

The channels 6, formed by the longitudinal partitions 5, can be closed with turnable registers 7 and placed in the inlet part of the nozzle 2.

The registers 7 may cut off the channels 6 independently of each other. The number of the registers 7 and the respective number of the channels 6 in the nozzles 2 may vary. A different design of the registers 7 is likewise possible.

The sprayers 3 (FIG. 2) may be arranged in the forepart of the cylindrical combustion chamber 1 along the perimeter thereof and in the same plane as the nozzles 2 so that the sulfur-containing melt sprayed by said sprayers is fed into the flow of air delivered by the nozzles 2.

An axial arrangement of the sprayers 3 in the cylindrical combustion chamber is likewise possible.

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The diaphragm 4 (FIG. 1) is installed in the rear part of the cylindrical chamber 1 and has a central hole 8 for the removal of gases therefrom; the diaphragm also has in its plane channels 9 designed for the additional delivery of air.

The additional flow of air may be fed to the channels 9 of the diaphragm 4 via tangential nozzles (not shown in the drawings) or by other known techniques.

The diaphragm 4 may be fashioned as two washers with a space between them designed for cooling the walls of the diaphragm.

The furnace for obtaining sulfur dioxide, according to the present invention, operates in the following manner.

A flow of air is fed to the furnace via the tangential nozzles 2 which create a vortex flow inside the cylindrical combustion chamber 1.

Simultaneously with the feeding of air, sulfur or sulfur-containing material is sprayed in with the aid of sprayers 3. In the air flow the melted sulfur burns with the formation of sulfurous anhydride.

Resultant gases leave the cylindrical chamber 1 via hole 8, wherein the remaining part of the melted sulfur burns due to the delivery of additional air via the channels 9 of the diaphragm 4.

Sulfurous anhydride obtained in the furnace is used for manufacturing, e.g., sulfuric acid.

Following are the advantages of the furnace for obtaining sulfur dioxide, according to the present invention.

Thanks to the delivery of air via the tangential nozzles divided into a number of channels at whose inlet there are installed cut-off registers, complete mixing is insured throughout the whole working load range of the furnace. At the same time, part of the channels is cut off when the furnace operates at partial loads, with a view to securing a high velocity of the delivery of air.

The provision of the diaphragm with air channels makes it possible to insure the cooling of the diaphragm and after-burning of the remaining part of sulfur.

The employment of the furnace according to the present invention makes it possible to increase the heat-release rate to approximately $5 \cdot 10^6$ Kcal./cu. m. hr., thus reducing the installation volume by 30 times, and the expenditures by approximately 20 times. The time required for starting the furnace is reduced by not less than 5 times.

Besides, the reliability of the installation is increased, while the cost of repairs is cut approximately by 100 times.

Although the present invention has been described hereinabove in connection with a preferred embodiment thereof, it is apparent that various alterations and modi-

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fications may take place without departing from the spirit and scope of the invention, as those skilled in the art will easily understand.

We claim:

1. A furnace for producing sulphurous gas comprising a cylindrically shaped combustion chamber, nozzles to feed primary air to said chamber, said nozzles being installed tangentially with respect to the circumference of the combustion chamber in a plane normal to the longitudinal axis thereof; sprayer means installed along the perimeter of the combustion chamber in the same transverse plane with the nozzles for introduction of sulfur-containing substances into said chamber; and a diaphragm in said chamber having an orifice for passage of the combustion products of the sulfur-containing substances, said diaphragm having radial channels therein for the passage of secondary air to the combustion products as they pass through said orifice.

2. A furnace for producing sulphurous gas as claimed in claim 1 wherein said nozzles include longitudinal partitions therein and dampers at the inlet of the nozzles; said dampers having open and closed positions to permit partial air supply to be effected under different operation conditions.

3. A furnace for producing sulphurous gas as claimed in claim 2 wherein said dampers are rotatable between said open and closed positions.

4. A furnace for producing sulphurous gas as claimed in claim 1 wherein said diaphragm is planar to produce overpressure in the chamber, said channels being in the plane of the diaphragm so that the secondary air serve as a coolant for the diaphragm.

5. A furnace for producing sulphurous gas as claimed in claim 4 wherein said diaphragm comprises a pair of axially spaced washers.

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