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(54) **A kiln burner for ceramic products**

(57) The burner for kilns for ceramic products comprises: a hollow body (2) having a cylindrical shape, which hollow body (2) exhibits a longitudinal axis (x) and is provided with at least a first inlet opening (3) for a comburant fluid, a second inlet opening (4) for a combustible fluid and an outlet opening (5) for a mixture of the combustible fluid and the comburant fluid; a mixer disc (6), positioned internally of the hollow body (2) between the first inlet opening (3) and the outlet opening (5), rotates concentrically to the hollow body (2); means for sparking (7), predisposed for igniting a combustion of a mixture of the combustible fluid and the comburant fluid internally of the hollow body (2). The second inlet opening (4) opens onto an internal surface of the hollow body (2) concentrically to the longitudinal axis (x) downstream of the mixer disc (6) with respect to the flow of the mixture of the combustible fluid and the comburant fluid.

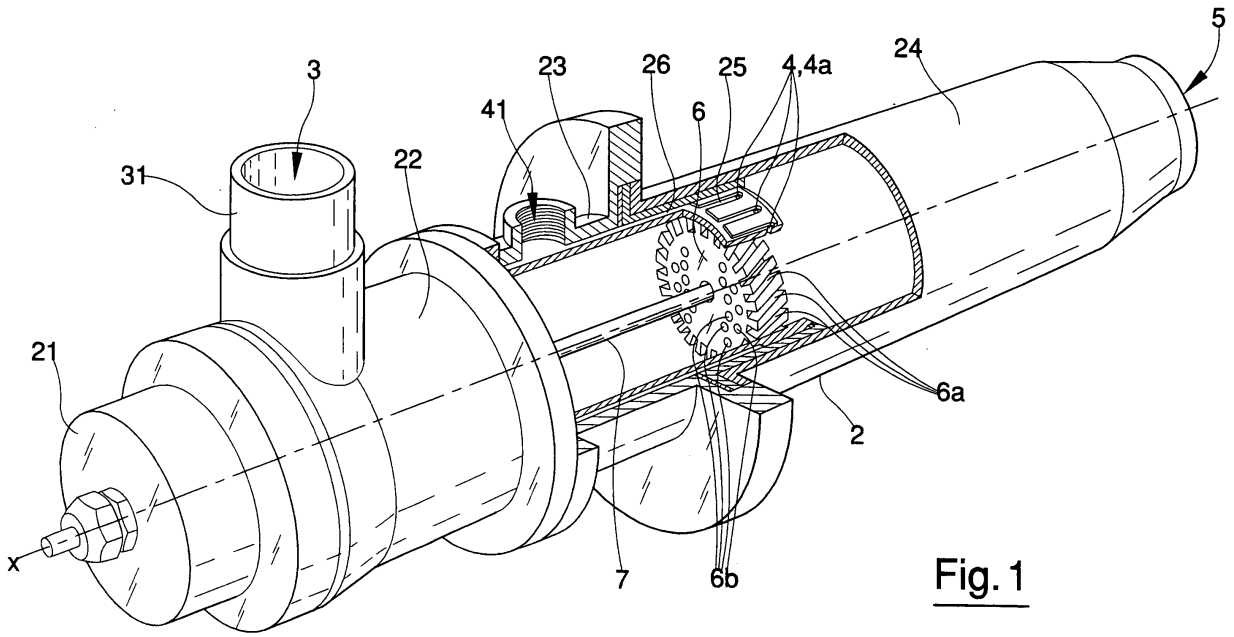

Fig. 1

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Description

[0001] The invention relates in particular to a burner comprising a hollow cylindrical body which exhibits a longitudinal axis and is provided with an inlet opening for a combustible fluid, an inlet opening for a mixture of comburant fluid and an outlet for a mixture of the combustible fluid and the comburant fluid. A mixer disc, positioned internally of the hollow body between the comburant inlet opening and the outlet opening, rotates concentrically of the hollow body with the aim of impressing on the comburant fluid a rotation which is concentric of the hollow body. The mixer disc separates what can be defined as a comburant inlet chamber from a chamber which can be defined a combustion chamber. Means for iigniting, for initiating a combustion of the mixture of combustible fluid and comburant fluid, typically an electrode in rod form, are predisposed to ignite the mixture internally of the hollow body, in particular in the combustion chamber which is located downstream of the mixer disc.

[0002] Burners of this type are known and widespread on the market. In the known-type burners the inlet opening for the combustible fluid is located in a concentric position to the hollow body. Generally the inlet opening is positioned at an end of the electrode, in proximity of the point in which the spark is set off to bum the mixture. The comburant fluid, on the other hand, flows into the combustion chamber through peripheral channels and holes in the mixer disc. In these conditions, the combustion of the mixture made up of combustible and comburant fluids is set off in a zone in which there is an excess of combustible fluid. The applicant has noted that this causes a lowering of combustion performance in the burner with a consequently relatively-high presence of non-combusted fuel at the burner outlet.

[0003] The aim of the invention is to provide a burner for kilns for ceramic products which enables an improvement in the combustion performance of the known-type burners. The aim is attained by providing an inlet opening for the comburant fluid which opens on the internal surface of the hollow body in such a way that the combustion is sparked in a zone in which there is a deficit of combustible fluid. The combustible fluid fuels the combustion progressively and along the whole longitudinal development of the hollow body, improving the combustion performance of the burner.

[0004] Further characteristics and advantages of the burner of the present invention will better emerge from the detailed description that follows, made with reference to the accompanying figure of the drawing, which is provided by way of non-limiting example.

[0005] With reference to the figure, the burner of the present invention comprises a cylindrical hollow body 2, preferably made of silicon carbide, which exhibits a longitudinal axis x and is provided with a first inlet opening 3 for a comburant fluid, a second inlet opening 4 for a combustible fluid, and an outlet opening 5 for a mixture of the combustible fluid and the comburant fluid. Preferably the hollow body 2 comprises four portions 21, 22, 23, 24 consecutively connected to one another. A first portion 21 defines a closed bottom wall of the hollow body 2 and is arranged at a first end of the hollow body 2. A second portion 22 affords the first inlet opening 3 which is positioned at an end of a conduit 31 which enters radially into the second portion 22. A third portion 23 affords a radial infeed opening 41 for the combustible fluid which opens into an annular jacket 26 defined between the internal surface of the third portion 23 and a sleeve 25 arranged internally of the hollow body 2. The annular jacket 26 is in communication with a source of combustible fluid (not illustrated) through the infeed opening 41 and is also in communication with an inside of the hollow body 2 through an opening which will be further described herein below. A fourth portion 24 of the hollow body 2, which affords at an end thereof the outlet opening 5, is associated to the third portion and contributes to defining the annular jacket 26.

[0006] A mixer disc 6 is positioned internally of the hollow body 2 between the first inlet opening 3 and the outlet opening 5. The mixer disc 6, which exhibits a determined thickness, rotates concentrically to the hollow body 2 and is laterally provided with shaped channels 6a which develop along tangential directions to a cylinder which is concentric to the longitudinal axis x of the hollow body 2. The mixer disc 6 is also provided with through-holes 6b which develop parallel to the longitudinal axis x of the hollow body 2. Preferably the disc 6 entirely occupies the internal section of the hollow body 2, in order that the comburant fluid can flow towards the outlet opening 5 along the shaped channels 6a and through the through-holes 6b. The rotation of the mixer disc 6 impresses on the comburant fluid a rotation which is concentric to the longitudinal axis x so that, at the outlet of the disc 6, the comburant fluid moves towards the outlet opening 5, in a spiral movement along the longitudinal axis x.

[0007] Means for igniting 7, predisposed to spark a combustion in the mixture of combustible fluid and comburant fluid internally of the hollow body 2, are arranged internally of the hollow body 2. Preferably the means for sparking 7 comprise a rod-shaped electrode arranged concentrically of the hollow body 2 in order that a spark is struck downstream of the mixer disc 6 with respect to the flow of comburant fluid, which comburant fluid is directed from the first inlet opening 3 towards the outlet opening 5. The mixer disc 6 is mounted rotatably on the electrode 7.

[0008] The second inlet opening 4 opens on the internal surface of the hollow body 2 concentrically of the longitudinal axis x downstream of the mixer disc 6 with respect to the flow of comburant fluid. Preferably the second inlet opening 4 is constituted by a plurality of holes 4a arranged on the internal surface of the hollow body 2 along a circumference which is concentric to the longitudinal axis x. Alternatively the holes 4a could be replaced, for example, by circumferential slits.

[0009] The holes 4a are afforded in the sleeve 25 and

place the annular jacket 26 in communication with the inside of the hollow body 2. The combustible fluid, fed into the opening 41, fills the annular jacket 26 and enters the hollow body 2 through the holes 4a. The holes 4a are preferably located downstream of the mixer disc 6 in the immediate vicinity of the disc 6 in order that the mixing between the combustible fluid and the comburant fluid will occur as soon as the comburant exits the shaped channels 6a of the mixer disc 6. The mixing of the combustible and comburant fluids thus obtained is advantageously extremely homogeneous as the flow of combustible is fractioned into jets which unite with the comburant fluid in a zone where the comburant fluid is highly dynamic. This leads to a considerable increase in the burner combustion performance. The comburant fluid coming from the through-holes 6b in the mixer disc 6 contributes to further increasing the mixture homogeneity. Further and advantageously, the flame sparked off downstream of the mixer disc 6 develops spirally about the longitudinal axis x by effect of the motion impressed on the comburant fluid by the mixer disc 6. This dynamic quality of the flame enables the heat produced by the combustion to propagate to relatively long distances from the outlet opening 5 along the longitudinal axis x, consequently improving the diffusion of the heat produced by the burner.

Claims

1. A burner for kilns for ceramic products, comprising: a hollow body (2) having a cylindrical shape, which hollow body (2) exhibits a longitudinal axis (x) and is provided with at least a first inlet opening (3) for a comburant fluid, a second inlet opening (4) for a combustible fluid and an outlet opening (5) for a mixture of the combustible fluid and the comburant fluid; a mixer disc (6), positioned internally of the hollow body (2) between the first inlet opening (3) and the outlet opening (5), rotates concentrically to the hollow body (2); means for igniting (7), predisposed for igniting a combustion of a mixture of the combustible fluid and the comburant fluid internally of the hollow body (2); **characterised in that** the second inlet opening (4) opens onto an internal surface of the hollow body (2) concentrically to the longitudinal axis (x) and downstream of the mixer disc (6) with respect to the flow of the mixture of the combustible fluid and the comburant fluid.

2. The burner of claim 1, **characterised in that** the second inlet opening (4) is constituted by a plurality of holes (4a) arranged on the internal surface of the hollow body (2) along a circumference thereof which is concentric to the longitudinal axis (x) and in proximity of the mixer disc (6).

3. The burner of claim 2, **characterised in that** the holes (4a) are afforded in a sleeve (25) arranged internally of the hollow body (2), which sleeve (25) together with the internal surface of the hollow body (2) defines an annular jacket (26) which is in communication with a source of combustible fluid through a radial infeed opening (41).

4. The burner of any one of the preceding claims, **characterised in that** the hollow body (2) is realised in silicon carbide.

5. The burner of any one of claims from 1 to 3, **characterised in that** the mixer disc (6) is laterally provided with shaped channels (6a) which develop along tangential directions of a cylinder which is concentric to the longitudinal axis (x) of the hollow body (2).

6. The burner of claim 5, **characterised in that** the disc (6) is provided with through-holes (6b) which develop parallel to the longitudinal axis (x) of the hollow body (2).

7. The burner of claim 6, **characterised in that** the disc (6) entirely occupies an internal section of the hollow body (2), in such a way that the comburant fluid flows towards the outlet opening (5) along the shaped channels (6a) and through the through-holes (6b).

8. The burner of any one of the preceding claims, **characterised in that** the means for sparking (7) comprise a rod-shaped electrode which is arranged concentrically of the hollow body (2) in order that a spark is emitted downstream of the mixer disc (6) with respect to the mixing of the comburant fluid.

9. The burner of claim 7 or 8, **characterised in that** the disc (6) is mounted rotatably on the electrode.

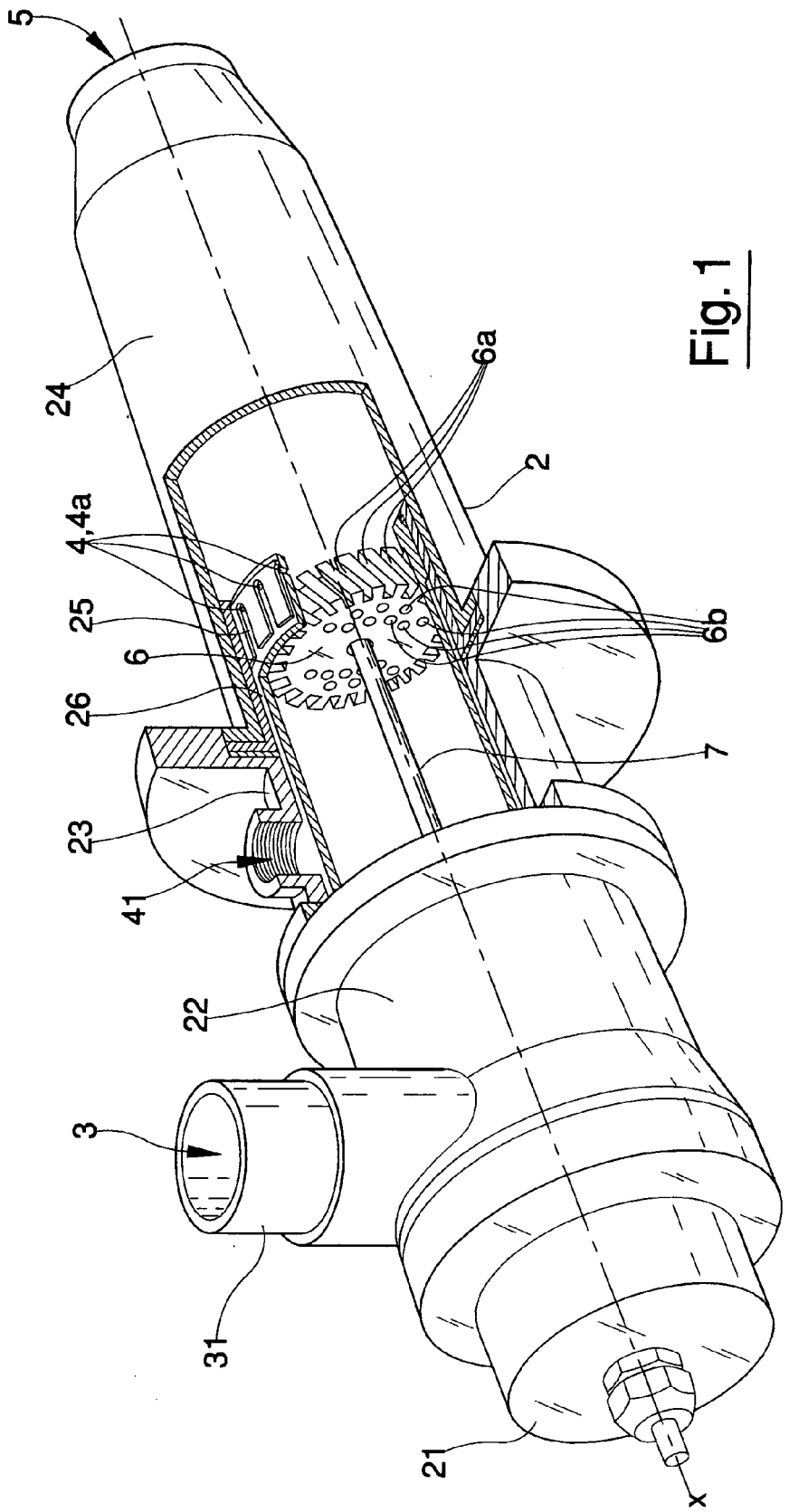

Fig. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 06 07 7318

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 462 716 A (RIELLO S P A [IT]) 29 September 2004 (2004-09-29) * paragraph [0016] - paragraph [0023] * * paragraph [0037] - paragraph [0041]; figures 3,5 *	1-3,5	INV. F23D14/24
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A	US 5 562 438 A (GORDON MICHAEL W [US] ET AL) 8 October 1996 (1996-10-08) * column 2, line 42 - column 3, line 67; figures 2,3 *	1	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 April 2007	Theis, Gilbert

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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