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(54) Atmospheric gas burner of longitudinal type with a radiating element which is generating lateral conduits for the stabilization of the flames

(57) Atmospheric gas burner of longitudinal type with a radiating element which generates lateral conduits for the stabilization of the flame in which, a curved length (21), which is made in the centre of the metallic rectangular plate that is forming the radiating element (2), is tightly fixed to the tubular and cylindrical length (11) which is laterally provided with two raws of primary holes (14) and two raws of secondary holes (15) and it is positioned in the portion which is comprised between these latter secondary holes.

Two curved portions are realized laterally to the curved length (21) and are bent outwards to form respective small lateral conduits (22) which are positioned coaxially to the raws of secondary holes (15) The outer edges of such curved portions, wherefrom are departing lateral wings (23), terminate near the raws of primary holes (14) as well as slightly-spaced from the surface of the tubular cylindrical length (11) thus forming narrow slits. The air/gas fuel mixture comes from the secondary holes (15), it penetrates in the lateral conduits (22) and it goes out through the said narrow slits thus producing pilot flames (F2) directed to the primary flames (F1) which are produced by the primary holes (14).

EP 1 058 054 A1

Description

[0001] The present invention relates to an atmospheric gas burner of longitudinal type in which an element for radiating and for protecting the flames is shaped in such a way as to form relative small conduits near the lateral raws of primary flames Such small conduits develop respective slits which are debouching over the same primary flames in such a way as to produce corresponding pilot flames whenever the small conduits are suitably fuelled.

[0002] Such pilot flames serve to stabilize the primary flames as a so-called pilot tile or other equivalent devices. Such burner is usable in various applications.

[0003] Atmospheric gas burners similar to the burner which is object of the present invention are already known as well as normally produced.

[0004] But, as it is also known, all such burners are more or less complicated because they require the formation and the assembly of several components, thus involving high realization costs, and present some restrictions and drawbacks.

[0005] Some burners of the above-mentioned type are provided with a semi-cylindric tube which is usually so-called " pilot tile ". Such pilot tile is positioned on the portion opposite to the radiating plate as well as applied on the tubular cylindrical element which is gas-fuelled to produce the primary flames through suited holes.

[0006] The pilot tile forms an interspace which, whenever it is fuelled by a part of the air/gas fuel mixture coming through relative holes, produces relative pilot flames through the slits developed by its edges which are disposed near the holes of the primary flames.

[0007] As it is known, such conformation and disposition present considerable drawbacks owing to the thermal stresses acting in the edges of the so-called "pilot tile".

[0008] Such stresses cause deformations as well as real erosions which reduce the service life of the burner.

[0009] Besides this, the presence of the "pilot tile" induces overheating of the relative zone and produces undesired backfires.

[0010] According to a known solution as that disclosed in the italian patent of the same applicant N. 1225116, said "pilot tile" is replaced with a special shape of the central part of the plate which is forming the radiating and protecting element of the flames.

[0011] Such known solution removes the above-mentioned disadvantages but it presents still restrictions and drawbacks.

[0012] According to this solution, the plate forming said radiating element is bent in its central portion in such a way as to create a curved longitudinal part which is fixed on the cylindrical tube generating the primary flame in order to delimite only one interspace which is acting as said "pilot tile".

[0013] The uniqueness of such interspace in combination with the considerable dimensions of the relative section still involve a remarkable heating of its parts and that limites the reducibility of maximum power rating of the burner because, at low powers, occur swellings and backfires.

[0014] It is an object of the present invention to solve the above stated problems of the already known gas burners of the same type of that in question and to improve their performances.

[0015] It is a further object of the present invention to reduce and to simplify as much as possible either the components or the production stages in order to obtain a simple, reliable and inexpensive burner

[0016] In order to better understand the features and the advantages attainable by the new gas burner which is forming the object of the present invention, this burner is hereinafter described, by way of a not limitative example only, and with reference to the accompanying drawing, wherein,

- the Figure 1 is a partially broken side view of a burner according to the present invention;
- the Figure 2 is a sectional view taken along section line I-I of the Figure 1.

[0017] As it can be seen from such Figures, in which the common items are marked with the same reference numerals, the gas burner forming the object of the present invention is essentially formed by two basic elements only and precisely a main tubular element 1 and a planar element 2, both of them can be easily obtained as well as assembled by means of known and normally used apparatuses

[0018] The main tubular element I is obtained from a suitable piece of steel-tube that is shaped in such a way as to form a suitable tubular and cylindric length 11.

[0019] One end 12 of such tubular length 11 is closed, while the other end is connected to the air/gas fuel mixture feeding group 13 whose conformation and working are well known.

[0020] Two raws of primary holes 14 and two further raws of secondary holes 15 are realized on the sides of the tubular and cylindric length 11.

[0021] Such raws of primary holes 14 are symmetrically opposite to each other.

[0022] The raws of secondary holes 15 are disposed in the same part with respect to the previous raws as well as near and parallelly equidistant to them.

[0023] The radiating element 2 is very similar to the other radiating elements which are used in the same kind of burners.

[0024] Such radiating element 2 will be obtained, as usual, by cutting a suitable steel-sheet in the form of a rectangle that will be successively shaped in the hereinafter described way.

[0025] As it can be seen from the above mentioned Figures and with particular reference to the Figure 2, a bending is made along the longitudinal axis of the steel-sheet.

[0026] Such bending forms a first arc-shaped length 21 having an inner radius of curvature which equals the outer radius of curvature of the tubular cylindrical length 11.

[0027] Such first arc-shaped length 21 is extending as far as near the raws of secondary holes 15 which are realized through the tubular cylindrical length 11 and, finally, it is tightly fixed to the part included between said raws of secondary holes 15.

[0028] The lateral edges of the first arc-shaped length 21 join to two curved portions which are bent outwards in such a way as to develop corresponding longitudinal and arcuate cavities which are forming two lateral conduits 22 having a small cross section.

[0029] Such conduits 22 are positioned coaxially to the relative raves of secondary holes 15 and, with their lateral and outer edges, are ending near the raws of the primary holes 14 and are slightly-spaced from the relative outer surface of the tubular cylindrical length 11 in order to form narrow slits which are suited to produce the pilot flames F2 as it will be hereinafter described.

[0030] Finally, the lateral and outer edges of the said lateral conduits 22 are joined to respective lateral wings 23 each of them is forming a relative radiating portion of the burner.

[0031] With regard to the illustrated embodiment, each lateral wings 23 comprises a first short length 23a which departs, with a sharp-joint, from the lateral outer edge of a relative lateral conduit 22 , it diverges outwards as well as turned towards the same part of the above first arc-shaped length 21 and, finally, it joins to a planar length 23c by means of a radial portion 23b.

[0032] As it is illustrated in the Figure 2, such planar lengths 23c follow convergent directions which are slightly and symmetrically inclined inwards. It is obvious that the planar lengths 23c could also be disposed in coplanar positions

[0033] The working of the burner is normal and obvious.

[0034] The fuel mixture is formed ,as known, in the end of the feeding group 13 and it is introduced in the inside of the tubular cylyndrical length 11 by this feeding group.

[0035] After that, the fuel mixture goes out of the tubular length 11. A part of the fuel mixture goes out through the pnmary holes 14 and another part of the fuel mixture goes out through the secondary holes 15, thus forming, upon suited ignition, respective primary flames Fl and pilot flames F2 . Such primary flames Fl and pilot flames F2 lick the respective lateral wings 23 which are so heated as to emit heat irradiation.

[0036] With respect to the known solutions and with particular reference to the previously recalled solution with only one cavity having a very large section, the above-described disposition of the said two lateral conduits 22, which generate respective longitudinal cavities having small sections, allows to obtain a considerable reduction of the power rating of the burner without backfires at low power.

[0037] It has been tried and tested that such reduction of power is practically twice as much as the reduction which is normally obtainable with other burners thus coming down to 1/6 of the power rating.

[0038] From what stated it is clear that the gas burner forming the object of the present invention affords considerable advantages.In the first place, such burner is composed of only two components which are easily obtainable by means of standard equipments.

[0039] Moreover, the realization and the assembly can be carried out by means of few operations which are easy to do in a short time.

[0040] Therefore, it follows that the production costs can be notably reduced thus allowing to obtain a finished product which is advantageously economic.

[0041] The particular conformation of the two lateral conduits allows to obviate the use of the normal "pilot tile" or of the other equivalent systems and to attain an advantageous reducibility of the power rating that is superior to the reducibility which is obtainable with similar burners and that's without the occurrence of backfires or other drawbacks

[0042] In conclusion, the burner forming the object of the present invention is very compact, it presents a notable structural simplicity, thus making the burner very economic, and it removes all the prevalent drawbacks which happen in the same kind of burners With respect to the burners of the same type, the burner forming the object of the present invention offers a longer service life, a greater efficiency and superior performances which cover a wide working range thus allowing a notable reducibility of the maximum power rating, which can decrease to 1/6 of the same value, and always under top safety and reliability conditions.

[0043] It is well understood that modifications and variations may be made to the burner forming the object of the present invention without departing however from the scope defined by the following claims with reference to the accompanying drawings and thence from the protection extent of the present industrial invention.

Claims

1. Atmospheric gas burner of longitudinal type with a radiating element which generates lateral conduits for the stabilization of the flames , such burner is comprising, in a known way, a main tubular element (1) developing a tubular cylindrical length (11) one end of which is closed and the other end of which is connected to a group (13) for feeding the air/gas fuel mixture , the tubular cylindrical length (11) is provided, on its sides, with two raws of primary holes (14) for producing primary flames (F1) as well as with two raws of secondary holes (15) which are feeding suited means for producing pilot flames (F2), a radiating element (2) being moreo-

ver applied to said tubular cylindrical length (11) and is formed by a suited rectangular sheet which is disposed in such a way as to develop two mutually and symmetrically equal lateral wings (23) which emit radiating heat when they are licked by the combination of the primary (F1) and the secondary flames (F2), such burner being characterized in that it is formed by two basic elements only and precisely by a main tubular element (1), the tubular cylindrical length (11) of which is laterally provided with two raws of primary holes (14) that are disposed in such a way as to be symmetrically opposite to each other and with two further raws of secondary holes (15) which are made near to the previous raws of holes as well as parallelly equidistant to them (14), and by a radiating element (2) made of a metallic and rectangular sheet which is shaped in such a way as to present, centrally and along its longitudinal axis, a first curved length (21) which is suited to allow the adhesion and the fixing of the sheet on a corresponding portion of the relative tubular cylindrical length (11) and, laterally to the said first curved length (21), two further short lengths which are bent in the same part of the previous length (21) and in such a way to develop relative longitudinal and curved cavities that are forming two corresponding lateral conduits (22) which are coaxially aligned with the respective raws of secondary holes (15) and , with their lateral and outer edges, they are ending near the raws of the primary holes (14) as well as slightly-spaced from the relative portions of the outer surface of the tubular cylindrical length (11) thus forming corresponding narrows slits, such lateral and outer edges of the said lateral conduits (22) join, by means of a suited bending, to two respective lateral wings (23) which are equal to each other and are symmetrically departing outwards.

2. Burner according to the claim 1, characterized in that the said lateral conduits (22) present a small cross section so that the part of the fuel mixture, which is penetrating in them through the respective raws of secondary holes (15) and which is going out through the slits resulting in their outer edges in order to produce corresponding raws of pilot flames (F2), is forced to rapidly flow through the inside of them and consequently to lick for a very short time the relative inner surface, this latter surface being so small, even though it is very hot during the functioning of the burner, that does not allow a critical heating of the fuel mixture which could produce, or at least it could concur to produce, undesired backfires; the particular conformation, the disposition and the dimensioning of the said lateral conduits (22) as well as the relative low heating of the fuel mixture, which is flowing through them, allow to considerably reduce the maximum power rating of the burner to one-sixth avoiding drawbacks and always with a perfect combustion.

3. Burner according to the claim 1, characterized in that the lateral edges of the said lateral conduits (22) join to the respective lateral wings (23) by means of a bending which forms a curved part having a fair outer radius of curvature even though it is an acute bending ; such particular conformation allows to avoid whether deformations or erosions on the same lateral conduits (22).

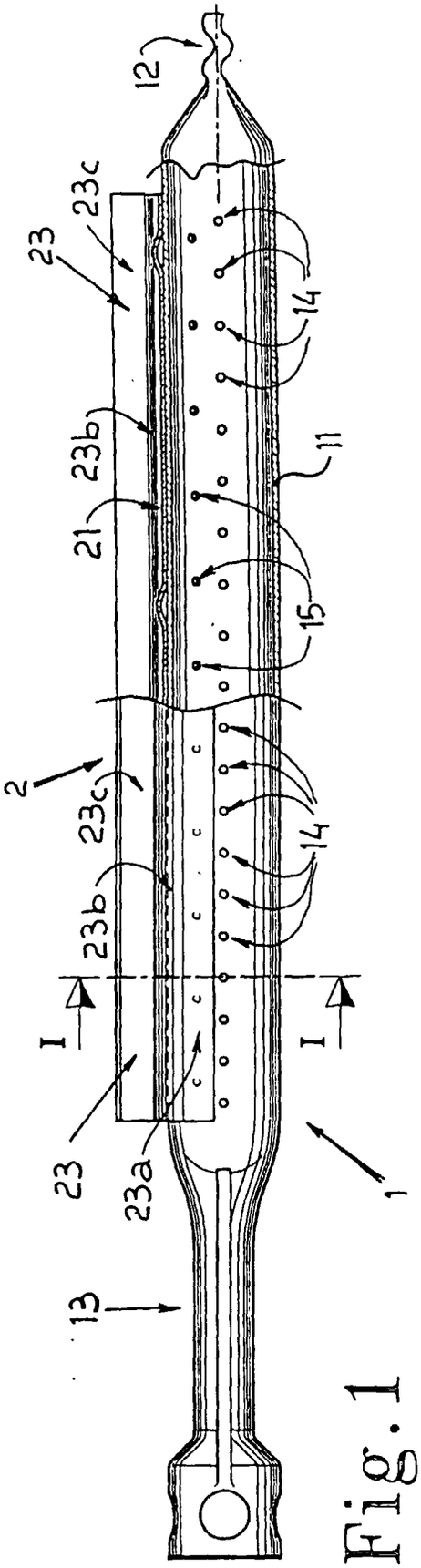
12
23c
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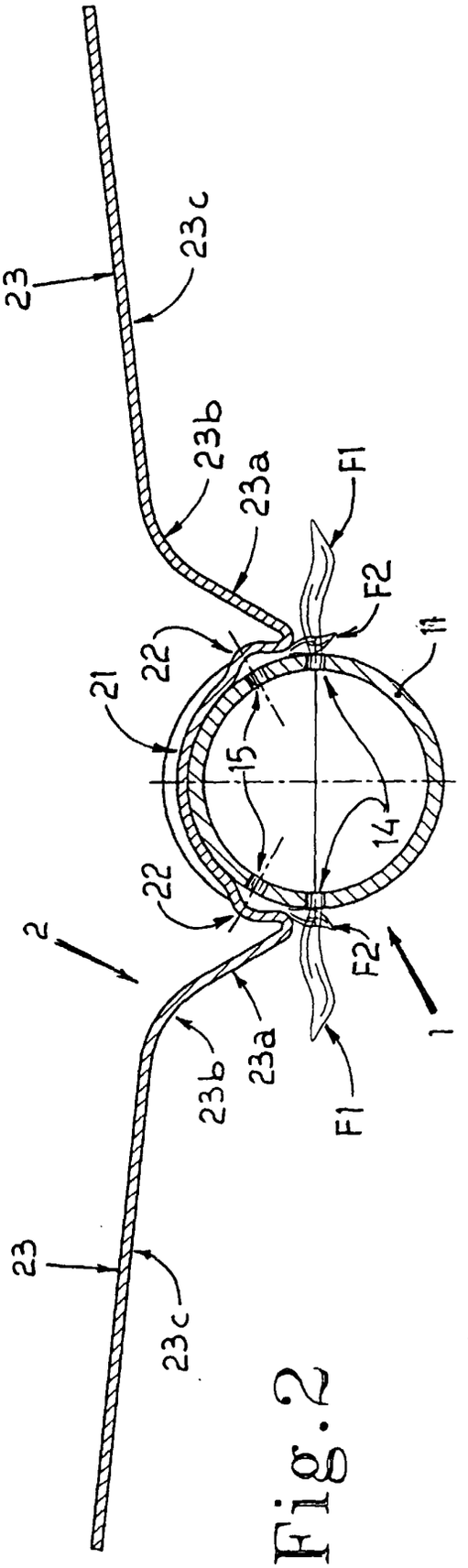
Fig. 1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23b
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F1
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Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 00 20 1845

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	IT 1 225 116 B (PEZZUTTI TIMOTEO) 2 November 1990 (1990-11-02) * page 7, line 8 - page 8, line 21 * * page 9, line 16 - page 11, line 17 * * figures 1,2 *	1	F23D14/10 F23D14/12 F23D14/26
A	FR 1 388 300 A (BOONSTRA FREDERIK) 26 May 1965 (1965-05-26) * the whole document *	1	
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A	US 4 416 249 A (REYNOLDS DECEASED HOWARD R ET AL) 22 November 1983 (1983-11-22) * column 4, line 48 - column 5, line 16 * * figures 4,5,7 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
F23D
F24C
A47J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 August 2000	Coquau, S

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82