

12

EUROPEAN PATENT APPLICATION

21 Application number: **86201933.8**

51 Int. Cl.4: **F23N 1/02**

22 Date of filing: **05.11.86**

30 Priority: **07.11.85 NL 8503058**

43 Date of publication of application:
16.06.87 Bulletin 87/25

84 Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

71 Applicant: **Nederlandse Industriële
Maatschappij NEFIT B.V.**
61001, Zweedsestraat
NL-7418 BB Deventer(NL)

72 Inventor: **Vloon, Paul**
2, Hondsrak
NL-7422 RM Deventer(NL)

74 Representative: **Reynvaan, Lambertus
Johannes, Ir. et al**
EXTERPATENT Willem Witsenplein 4
NL-2596 BK 's-Gravenhage(NL)

54 **Process for the ignition of a burner, and a burner for carrying out this process.**

57 A process for the ignition of a burner (I), in particular for a boiler or a heating appliance said burner comprising a gas supply (4), an air supply provided with a fan (II) and a burner plate (7) provided with openings. An electronic ignition element - (8) being arranged which is connected to a control device (9) for putting burner into operation and igniting the air-gas mixture. During the ignition phase of the burner the air/fuel ratio is lowered and after ignition of the mixture the ratio is raised to the operating value of the burner.

The control device (9) being connected to regulating elements (11,12) which are disposed in the air inlet and/or fuel inlet for controlling the air/fuel ratio.

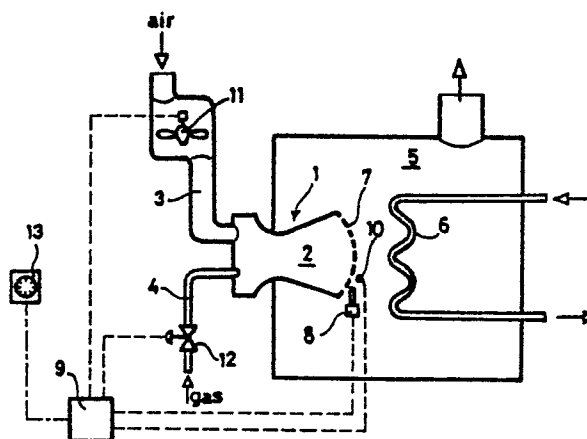


Fig. 1.

EP 0 225 655 A1

Short title: Process for the ignition of a burner, and a burner for carrying out this process.

The present invention relates to a process for the ignition of a burner, in particular for a boiler or a heating appliance, said burner comprising a gas supply, an air supply provided with a fan, and a burner plate provided with openings, while there is provision for an electronic ignition element which is connected to a control device for putting the burner into operation and igniting the air-gas mixture.

The process relates both to a burner where the total quantity of combustion air is fed in by means of a fan and mixed with the fuel in a mixing chamber (total premixing) and to a burner where the primary combustion air is induced by the fuel and the secondary combustion air is fed in by means of a fan.

In the burners currently in use the pilot flame is often replaced by an electronic ignition element which, for example, ignites the burner in response to a signal coming from a room thermostat. Such an ignition element has the advantage that a pilot flame consuming a large quantity of fuel is not necessary.

Problems do, however, occur with the use of an electronic ignition element. In the first place, the ideal air/gas ratio (air factor) for the ignition depends on the type of fuel used. Moreover, a cold appliance has a different characteristic from that of a warm appliance. For when the burner is not ignited the quantity of air fed in appears to be greater than when the burner is ignited. This is due to the fact that the resistance over the appliance is lower when the burner is not ignited than when it is ignited. The density of air is greater at a low temperature, so that on ignition of a cold appliance the air factor is too great for easy ignition of the mixture.

In burners where only the secondary combustion air is supplied by means of a fan, there is also the disadvantage during the ignition that the mixture for combustion emerging from the openings in the burner head is "blown away". There is then the risk of the ignition element not lying in the out-flowing mixture. Besides, the eddies occurring and the relatively high air speeds will make ignition difficult.

The object of the invention is to produce a process for the electronic ignition of a burner, in which the above-mentioned difficulties are avoided.

This object is achieved according to the invention in that during the ignition phase of the burner the air/fuel ratio is lowered, and after ignition of the mixture the ratio is raised to the operating value of the burner.

The ratio according to the invention is preferably lowered gradually during the ignition phase.

In this way a continuously varying air factor is obtained during the ignition phase, so that regardless of the type of gas and the state of the heating appliance the ideal mixture for ignition is always obtained.

In a preferred embodiment of the process according to the invention the air/fuel ratio is varied by regulating the speed of the fan.

The invention is also embodied in a burner for carrying out the process according to the invention, which burner is characterized in that the control device is connected to regulating elements which are disposed in the air inlet and/or fuel inlet for reducing the air/fuel ratio during the ignition phase of the burner, and a detector for monitoring the combustion of the mixture is connected to the control device for increasing the air/fuel ratio to the operating value of the burner after ignition of the mixture.

It is pointed out that means for varying the air factor are known per se. However, this has hitherto taken place as a function of the load of the burner, in order to ensure the optimum possible combustion.

The invention is explained in greater detail with reference to the drawing, in which:

Fig. 1 shows a schematic illustration of a burner with which the process according to the invention can be used;

Fig. 2 shows a graph in which the change in the air factor is plotted against time.

In Fig. 1 the process according to the invention is explained with reference to a burner 1 with complete premixing of combustion air. The process according to the invention can, however, also be used with an atmospheric burner, where only the secondary combustion air is supplied by means of a fan.

As can be seen from Fig. 1, the burner 1 comprises a mixing chamber 2, which is connected on one side to an air inlet 3 and a fuel inlet 4 for the infeed of an air-gas mixture. The burner 1 is disposed inside a combustion chamber 5 of a boiler or heating appliance, in which combustion chamber is disposed a heat exchanger 6 for heating of a medium. The mixing chamber 2 is shut off at the side facing away from the air and fuel inlet by a burner plate 7 which is situated in the combustion chamber 5 and is provided with openings through which the air-gas mixture flows into the combustion chamber. Disposed some distance away from the burner plate inside the combustion chamber 5 is an ignition element 8 which is connected to a control device 9. Near the burner plate

7 in the combustion chamber 5 there is also a detector for monitoring the combustion of the air-gas mixture, said detector also being connected to the control device 9.

The air inlet 3 is provided with a fan 11, which is connected to the control device 9, while the fuel inlet 4 is provided with a regulating valve 12, which is also connected to the control device 9. Finally, one or more room thermostats 13 are connected to the control device.

When the thermostats 13 call for heat, the control element 9 will start the fan and open the regulating valve 12, so that in the mixing chamber 2 of the burner 1 an air-gas mixture is formed and flows through the openings in the burner plate 7 into the combustion chamber 5. The electronic ignition element 8 will be actuated by the control element 9 for ignition of the air-gas mixture. If the heating appliance is cold, the air fed in through the inlet 3 will meet with little resistance, so that the fan 11 has a greater output. This results in a high air factor, which makes the air-gas mixture difficult to ignite. As a result of the lower temperature of the air, the density of the air is greater, so that relatively more air is displaced by the fan, which further increases the above-mentioned effect of a high air factor.

In order to ensure the ignition of the burner, the speed of the fan 11 is reduced and/or the fuel supply to the burner increased during the ignition phase, so that during the ignition the air factor is reduced, and the above-mentioned influences are removed, so that the mixture has the correct air-gas ratio which is ideal for the ignition. The ignition of the mixture is monitored by the detector 10, which then gives off a signal to the control element 9, following which the air factor in creases to the normal operating value of the burner.

The process according to the invention can also be used with an atmospheric burner where the secondary combustion air is supplied by means of a fan. The secondary combustion air supplied by the fan makes ignition difficult through the "blowing away" of the air-gas mixture emerging through the burner plate. The combustible mixture is converted by the inflowing secondary air into a narrow cloud, the correct position of which is difficult to determine beforehand. This means that there is a risk of the ignition element lying outside this cloud. The high speeds and the eddies occurring also make ignition difficult. By reducing the speed of the fan during the ignition phase, a broad "cloud" of combustible air-gas mixture is produced near the burner plate, so that it is ensured that the ignition element lies within this cloud.

It will be clear that the means for reducing the air factor during the ignition phase can vary from those which are shown in the drawing. For example, the air inlet 3, can also have a variable resistance element, by means of which the quantity of infed air during the ignition phase can be reduced. The fan could be shut off entirely during the ignition.

Fig. 2 is a graph showing the curve of the air factor, where the ignition area for a gas A and for a gas B are indicated. It can be seen from this figure that different gases can have different ideal ignition areas and it is possible by means of the process according to the invention to ignite the burner irrespective of the type of gas used.

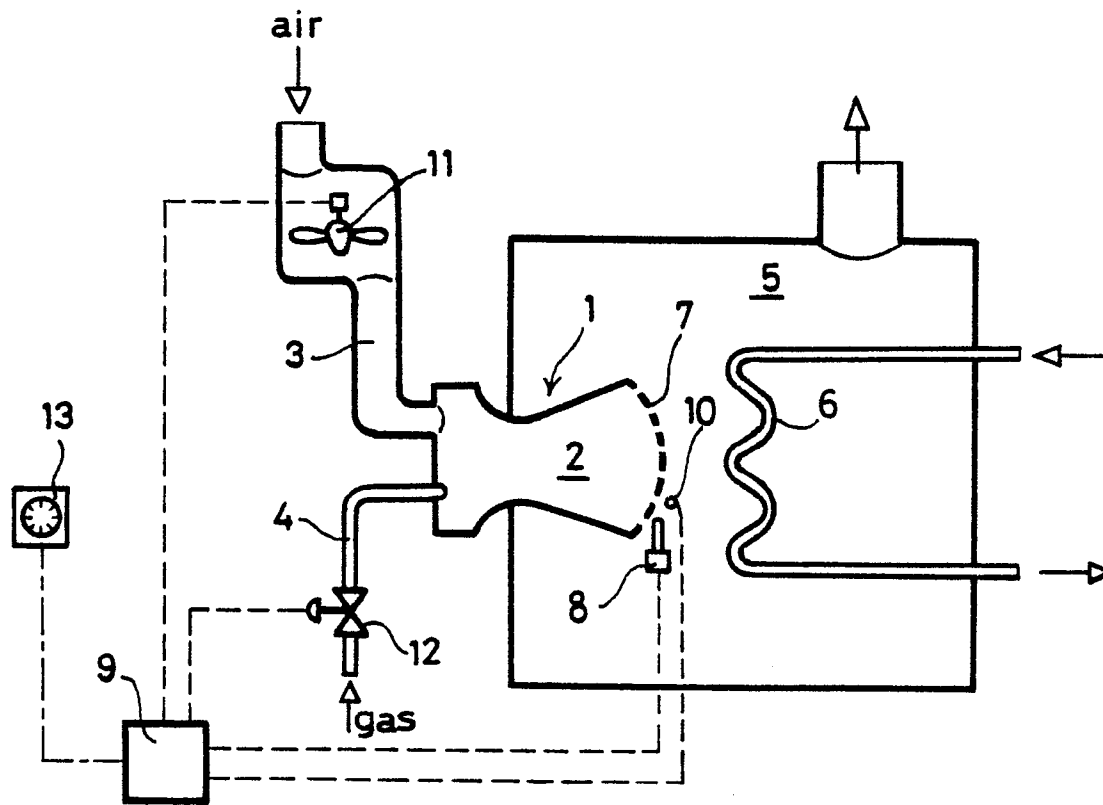
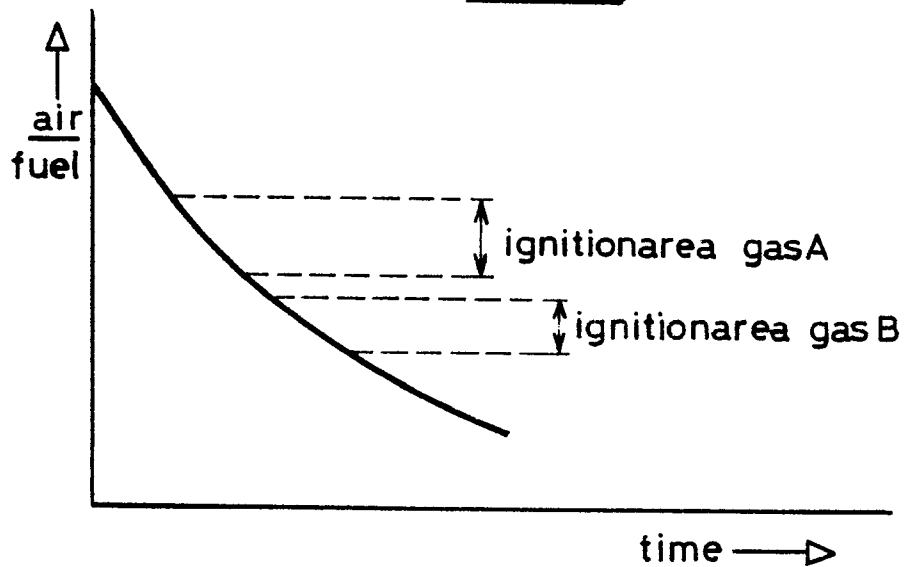
Claims

1. Process for the ignition of a burner (I), said burner comprising a gas supply (4), an air supply - (3) provided with a fan (II), and a burner plate (7) provided with openings, while there is provision for an electronic ignition element (8) which is connected to a control device (9) for putting the burner into operation and ignition the air-gas mixture, characterized in that during the ignition phase of the burner the air/fuel ratio is lowered, and after ignition of the mixture the ration is raised to the operating value of the burner.

2. Process according to claim 1, characterized in that the air/fuel ratio is lowered gradually during the ignition phase.

3. Process according to claim 1 or 2, characterized in that the air/fuel ratio is varied by regulating the speed of the fan (II).

4. Burner for carrying out the process according to one of the preceding claims 1 -3, characterized in that the control device (9) is connected to regulating elements (11,12) which are disposed in the air inlet and/or fuel inlet for reducing the air/fuel ratio during the ignition phase of the burner, and a detector (10) for monitoring the combustion of the mixture is connected to the control device for increasing the air/fuel ration to the operating value of the burner after ignition of the mixture.

**FIG: 1.****FIG: 2.**



EP 86 20 1933

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.4)
X	FR-A-2 250 960 (UNITED GAS INDUSTRIES) * Claim 1; page 5, lines 6-37 *	1	F 23 N 1/02
A		3,4	
A	--- US-A-3 912 162 (BAUER) * Claims 5,10 *	1-4	
A	--- PATENTS ABSTRACTS OF JAPAN, vol. 9, no. 11 (M-351)[1734], 18th January 1985; & JP-A- 59 158 914 (ISEKI NOKI K.K.) 08-09-1984 * The whole document *	1-4	
A	--- FR-A-1 560 110 (MUFF) -----		TECHNICAL FIELDS SEARCHED (Int. Cl.4) F 23 N
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-01-1987	Examiner THIBO F.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	