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⑷ Applicant: **ENCON B.V.**  
**Zuidlaarderweg 12**  
**NL-9482 TW Tynaarlo(NL)**

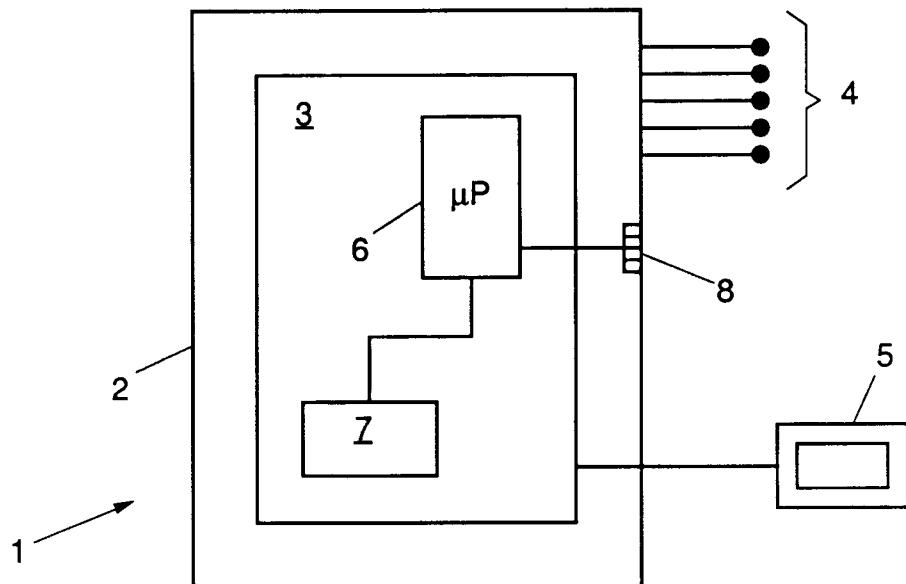
⑵ Inventor: **Koetsier, Adrianus**  
**Havixhorst 13**  
**9331 GA Norg(NL)**

⑷ Representative: **Smulders, Theodorus A.H.J.,**  
**Ir. et al**  
**Vereenigde Octrooibureaux**  
**Nieuwe Parklaan 97**  
**NL-2587 BN 's-Gravenhage (NL)**

④ **Automatic burner control device for a gas appliance, suitable in particular for a boiler of a central heating system.**

④ An automatic burner control device for a gas appliance, suitable in particular for a boiler of a central heating system. The automatic burner control device comprises a memory in which, during operation, information is stored concerning at least the

nature of the troubles occurring and the number of times that the troubles occur, while further comprising a connecting gate through which the contents of the memory can be read.



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The invention relates to an automatic burner control device for a gas appliance, suitable in particular for a boiler of a central heating system.

Such automatic burner control devices are known from practice and substantially comprise an electronic circuit, often provided with a microprocessor, by means of which the operation of the gas appliance is controlled and monitored. The automatic burner control device effects, for instance, the ignition of the (main) burner at the times when heating is required, or the extinguishment of the burner.

The automatic burner control device also controls the fan for supplying combustion air and, in the case of a central heating system, the operation of the circulating pump. Further, the automatic burner control device can monitor a pilot flame. In the case of a central heating boiler that is combined with a hot-water provision, such as a water heater, an automatic burner control device can also control the valve that provides the supply of heating water to the water heater.

The automatic burner control device can also detect troubles and, if necessary, switch off the gas appliance. Regularly occurring troubles are, for instance, too high a boiler temperature, deficiency of air, deficiency of gas, ignition failure, and the like. In the event of such troubles, the automatic burner control device is locked and the gas appliance is switched off. Typically, the nature of the troubles is indicated by a code, for instance a figure, on a display device, so that the user or serviceman is able to see which type of trouble is involved.

A drawback of the known automatic burner control device is that the serviceman, it is true, can see the trouble code at the time when he finds himself near the gas appliance, but he cannot see whether the trouble has already occurred before and if so, how often. Neither can he see whether any other troubles have perhaps occurred before, since in most cases, the user will first try and bring the gas appliance back into operation himself before calling for a serviceman's assistance. In the case of some kinds of trouble, the gas appliance will be functioning normally again for some time after the trouble, and in those cases it may take considerable time and a relative large number of troubles may occur before the serviceman is on the spot. Information about the number of troubles, the frequency of the troubles and the nature of the previous troubles can then only be obtained at second hand and is often not very accurate.

From Patent Abstracts of Japan, Vol. 14, No. 135 (M-949) (4078), March 14, 1990 (& Japanese patent application 63-153909), a similar trouble detector for a gas appliance is known, which is connected to an automatic burner control device and comprises a memory element in which the nature

of the trouble that has occurred can be stored. Also provided is a connecting gate for a computer. However, information about the number of previous troubles is not stored in the memory of the known device.

From Patent Abstracts of Japan, Vol. 16, No. 90 (M-1218), March 5, 1990, a trouble detector for a combustion appliance is known, which incorporates a memory element for temporarily storing a number of troubles which occurred in the past. The known trouble detector can be read out at a distance via a transceiver connection by a control device disposed at a distance. A drawback of this construction is that the trouble detector and the automatic burner control device are not integrated into one unit.

The object of the invention is to overcome the abovementioned drawbacks and generally to provide a compact, effective and simple automatic burner control device.

To that end, according to the invention, an automatic burner control device of the type described is characterized in that the memory is designed to register, in addition to the nature of a trouble, the number of times that a trouble has occurred in the past, and that the automatic burner control device comprises a programmable unit, which is connected to the connecting gate for reading out the memory and can be (re)programmed via the connecting gate.

The invention will be further described hereinafter with reference to the accompanying drawing.

The drawing schematically shows an automatic burner control device 1, comprising a housing 2, containing an electronic circuit 3 usually mounted on a single printed circuit board. The automatic burner control device has a plurality of connecting possibilities, schematically shown at 4, for lines leading to various parts which belong to the gas appliance, such as a pilot flame burner, an ignition, a main burner, a gas valve, a fan, a circulating pump, a temperature sensor and the like. Further, a display device is shown at 5, which may comprise, for instance, an LCD-screen or a plurality of LEDs, by means of which, in the event of trouble, the nature of the trouble can be displayed in code.

In the example shown, the automatic burner control device also comprises a microprocessor, schematically shown at 6.

According to the invention, the automatic burner control device is further provided with a memory 7, wherein, upon occurrence of a trouble, the corresponding trouble code is stored. It is possible to store each individual trouble separately. It is also possible to store each type of trouble together with the number of times that the trouble has occurred. After the first time, only the factor indicating the

number of previous troubles of the same nature needs then to be changed. To this end, the memory can, for instance, be divided into a number of sections, each corresponding with a predetermined type of trouble. The circuit can be designed such that information can be visualized via the display device 5, with or without a command being given first, for instance via a push button. However, in order to do so, the display device must be adapted to the amount of data to be displayed.

Other information, not directly related to troubles, could also be stored in the memory 7. The memory 7 is preferably a non-volatile memory, so that the information stored will not be lost in the event of a power cut.

According to a preferred embodiment of the invention, the automatic burner control device comprises a special connecting gate 8, which is suitable for connecting a service device, for instance a service computer, and through which the memory 7 can be read out directly or indirectly, for instance via the microprocessor, if present. The gate 8 may also be designed to (re)program the automatic burner control device.

The connecting gate 8 can advantageously be a standardized serial interface of the type RS 232. The serviceman can connect his service computer or a specially designed service device to the connecting gate and read out the nature of the trouble, as well as information about any previous troubles, at least since the previous visit by the serviceman. This information can also be printed if a printer is coupled to the service computer or the service device.

According to a further elaboration of the invention, the automatic burner control device can comprise a time measuring circuit, indicating for each trouble the date and time of its occurrence. In that case, this information can also be stored in the memory. It would also be possible to store similar information regarding the renewed operation of the appliance after a trouble and any other events of interest. Via the connecting gate, the serviceman may then have a complete overview of the course of the operation of the gas appliance over time. When a time measuring circuit is used, a separate power supply in the form of an accumulator or a battery could be used, or an emergency supply, automatically taking over the supply of energy in the event of a power cut.

Also in the case where no time measuring circuit is present, the connecting gate offers the possibility of temporarily providing a service computer with a time measuring device and, optionally, of connecting a printer, so that the serviceman can still obtain a complete overview of a limited period. Of course, the connecting gate also offers the possibility of reading out the memory or the opera-

tion of the automatic burner control device and hence of the gas appliance at a distance, or of (re)programming the automatic burner control device at a distance.

It is observed that after the foregoing, various modifications will readily occur to anyone skilled in the art. For instance, if a special connecting gate is present, through which the contents of the memory can be read and displayed, the conventional display device 5, which exclusively displays the trouble code, could optionally be omitted.

These and similar modifications are considered to fall within the scope of the invention.

## 15 Claims

1. An automatic burner control device for a gas appliance, suitable in particular for a boiler of a central heating system, comprising a memory, wherein, during operation, information is stored concerning the nature of a trouble occurring and the number of times that troubles occur, and further comprising a connecting gate through which the contents of the memory can be read, characterized in that the memory is designed to register, in addition to the nature of a trouble, the number of times that a trouble has occurred in the past, and that the automatic burner control device comprises a programmable unit, which is connected to the connecting gate for reading out the memory and can be (re)programmed via the connecting gate.
2. An automatic burner control device according to claim 1, characterized in that the connecting gate forms a standardized serial interface.
3. An automatic burner control device according to any one of the preceding claims, characterized in that the automatic burner control device comprises a time measuring circuit, indicating at least for each trouble the date and time of its occurrence, which information is stored in the memory.
4. An automatic burner control device according to any one of the preceding claims, characterized by a display device capable of displaying the contents of the memory.
5. An automatic burner control device according to any one of the preceding claims, characterized in that the memory is a non-volatile memory.
6. A central heating boiler, characterized by an automatic burner control device according to

any one of claims 1-5.

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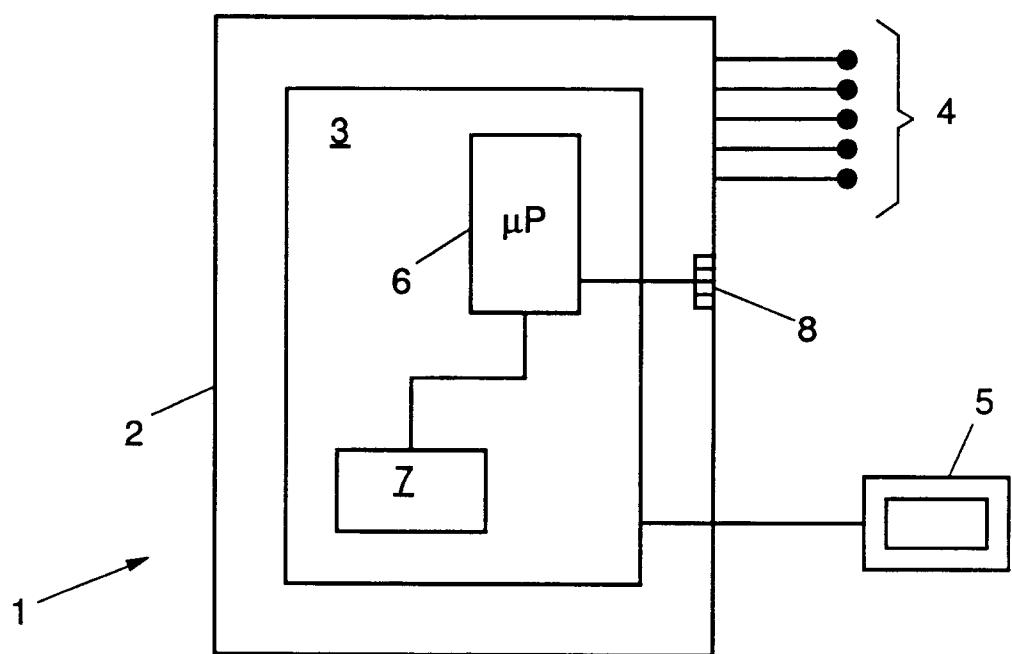
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EUROPEAN SEARCH REPORT

Application Number

EP 93 20 0871

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y,D	PATENT ABSTRACTS OF JAPAN vol. 14, no. 135 (M-949)(4078) 14 March 1990 & JP-A-20 04 127 ( MATSUSHITA ELECTRIC ) * abstract; figure *	1,6	F23N5/26 F23N5/24
Y	EP-A-0 421 550 (NEFIT) * column 3, line 32 - column 5, line 3; figure 1 *	1,6	
A,P	EP-A-0 498 034 (PALOMA KOGYO KABUSHIKI KAISHA) * abstract; claims 1,2; figures *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 12, no. 241 (M-716)(3088) 8 July 1988 & JP-A-63 032 219 ( MITSUBISHI ELECTRIC ) * abstract; figure *	2	
A	PATENT ABSTRACTS OF JAPAN vol. 11, no. 172 (M-595)(2619) 3 June 1987 & JP-A-62 005 018 ( MITSUBISHI ELECTRIC ) * abstract *	3	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A,D	PATENT ABSTRACTS OF JAPAN vol. 16, no. 90 (M-1218)5 March 1990 & JP-A-32 71 622 ( MATSUSHITA ELECTRIC ) * abstract; figure *	4	F23N
A	PATENT ABSTRACTS OF JAPAN vol. 14, no. 135 (M-949)(4078) 14 March 1990 & JP-A-20 04 126 ( MATSUSHITA ELECTRIC ) * abstract; figure *	5	
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	20 AUGUST 1993	KOOIJMAN F.G.M.	
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