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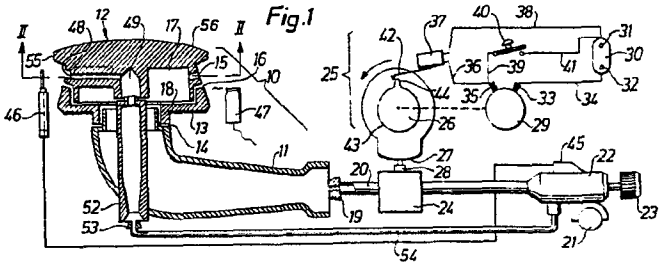
(54) **Heating arrangement comprising a burner having a pilot flame.**

(57) A burner (10) comprises a venturi tube (11) and a burner head (12) with ports (15) for main flames. The venturi tube (11) is supplied with gas from a manually operable cock (22) via a conduit (20) including a gas valve (24) operated by a control device (25) to cause the burner (10) to operate intermittently. An additional venturi tube (52) supplies gas to pilot ports (48) in the burner head (12) and is separately connected to the cock (22) so as to keep the pilot flames burning during periods of extinguished main flames.

Fig.1



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Heating arrangement comprising a burner having a pilot flame

The present invention relates to a heating arrangement in accordance with the preamble of the appending claim 1.

In the French Patent Publication No. 2,418,910 a burner is disclosed which is connected to a manifold via a gas valve operated by a control device to alternately open and cut off the gas supply to the burner at predetermined intervals. The control device comprises a cam disc which is rotated by an electric motor. The cam disc is provided with a cam surface which co-operates with an operating member on the gas valve to open the said valve and to close it, respectively. Another cam surface on the cam disc co-operates with a spark generating device which includes an igniter positioned close to the burner.

When operating intermittently, the burner referred to is repeatedly ignited by sparks and some time before the activation of the spark generating device, the gas valve has to be opened. Hence, a small amount of unburnt gas will be emitted each time the burner changes from its extinguished into its lit condition. If the burner is operated intermittently for a long time, gas may accumulate and contaminate the surrounding atmosphere which at least may cause an unpleasant smell.

Another disadvantage is concerned with the provision of a thermocouple to be heated by the burner flames to keep a security valve open, the said security valve cutting off the gas supply if the burner should blow out and remain extinguished for a predetermined time. The extinguished burner has to be re-ignited before the EMF of the thermocouple has dropped below a predetermined level at which the security valve will cut off the gas supply. Accordingly, the period of extinguished burner will be dependent on the characteristics of the thermocouple and with the thermocouples available on the market the useful range of possible heating settings will be limited.

An additional drawback is concerned with the fact that during intermittent operation a great number of sparks are emitted which cause noise.

The primary object of the invention is to eliminate the drawbacks indicated above and to provide a heating arrangement with a burner which can be operated intermittently without emitting any noisy sparks and without the limitation caused by the short drop-out time for the EMF of the thermocouple.

The object will be achieved in a heating arrangement comprising a burner having the characterizing features of claim 1.

Preferred embodiments have been included in the subclaims.

An embodiment of the invention will now be described with reference to the accompanying drawings.

Fig. 1 is a schematic diagram of a sectionalized burner and accompanying control elements.

Fig. 2 is a section along the line II - II in Fig. 1.

In Fig. 1 a burner, generally denoted by 10, comprises a venturi tube 11, and a burner head 12 which comprises a collar 13 and a top cover 56. The collar rests loosely on a flange 14 on the venturi tube and the top cover 56 rests on the collar. Openings 15 are provided in the burner head for main flames and in a conventional way openings 16 are provided for main flame supporting pilot flames. The burner head also comprises a mixing chamber 17, part of which is delimited by a horizontal wall 18 on the collar 13.

The venturi tube 11 is supplied with gas from an injector 19 terminating a gas conduit 20 which is connected to a manifold 21 via a cock 22 operated by a knob 23. A mechancally operated gas valve 24 is disposed in the conduit 20 to make possible the intermittent operation of the burner 10. For this purpose a control device 25 is provided wherein a cam disc 26 has a cam surface 27 acting upon a microswitch 28 which operates the valve 24. The cam disc 26 is rotated by an electric motor 29 and the design of the cam surface 27 determines the periods during which the valve 24 is open and closed, respectively. The motor is connected to a power supply via a terminal block 30 having terminals 31, 32. A first motor terminal 33 is connected to the terminal 32 via a conductor 34 and a second motor terminal 35 is connected to the terminal 31 via a conductor 36, a microswitch 37 and a conductor 38. The motor terminal 35 is also connected to the terminal 31 via a conductor 39, a push-button operated switch 40 and a conductor 41. The microswitch 37 has an actuating member 42 which co-operates with an additional cam surface 43 on the cam disc 26, the said additional surface including a projection 44.

In order to prevent gas from being emitted in case the burner flames should blow out, the cock 22 has an integrated solenoid operated valve 45 which is controlled by a thermocouple 46 positioned adjacent to the burner so as to be heated by the flames. When the thermocouple is heated, an EMF is generated which

will keep the solenoid valve 45 open. If the burner should blow out or if the gas supply for some other reason should be cut off for a period exceeding a predetermined time, the EMF will drop below the holding level and the valve 45 will close and permanently cut off the gas supply. An electric igniter 47, in the shape of a spark plug, is provided for initial igniting of the burner or for re-igniting in case the burner has been extinguished due to operation of the solenoid valve 45.

During intermittent operation the burner has to be ignited automatically via the control device 25 and for this purpose the invention makes use of continuously burning pilot flames formed by three pilot ports 48 which are equally distributed along the periphery of the burner. Each port 48 is connected to a central mixing chamber 49 in the top cover 56 via a channel 50 having an inlet openring 51 of reduced cross-section. The mixing chamber is supplied with an air/gas mixture by a separate venturi tube 52 which is fed by an injector 53 terminating a conduit 54 which is connected to the cock 22. The pilot flames from the ports 48 are used exclusively for lighting purposes and must not cause any significant heating of a cooking vessel during periods of extinguished burner. To eliminate this problem of direct heating, the top cover 56 is provided with a peripheral flange 55 that extends beyond the port 48 a distance corresponding at least to the length of the pilot flames. Moreover, the upper part of the top cover has a thickness selected to have the burner head taking up the energy transferred to it by the pilot flames.

The burner described above functions in the following way. In order to activate the burner 10 the knob 23 is rotated to a position setting the cock 22 for a predetermined gas flow. However, the series connected valve 45 also has to be opened to allow gas to pass the cock 22. For this purpose pushing of the knob 23 operates mechanically the valve 45 into its open position. A cock of the design described having a thermocouple operated security valve is available on the market and will not be described in detail. At the same time as the knob 23 is being pushed, a push-button, not shown, is operated to activate the igniter 47 to emit sparks to ignite the gas flowing through the ports 15, 16 and 48 in the burner head 12. As soon as the thermocouple has been warmed up by the flames from the burner, usually after a period of between 4 and 6 seconds, the knob 23 may be released and the voltage required for keeping the solenoid valve 45 activated will be generated by the thermocouple. This initial procedure is the same should the burner be set for continuous or for intermittent operation.

Intermittent operation is initiated by operation of the switch 40 to connect the motor 29 to the mains represented by the terminals 31, 32. In the rest position of the cam disc 26 the microswitch 28 operates the valve 24 to open which constitutes a condition for the continuous operation of the burner. However,

rotation of the cam disc 26 causes the projecting part of the cam surface 27 to leave the microswitch 28 which will be operated to close the valve 24 and hence to cut off the gas supply to the main ports 15 and to the stabilizing pilot ports 16. During the period of extinguished main flames the igniting pilot flames from ports 48 will remain because these ports are separately supplied. The thermocouple is positioned to be heated by a pilot flame from a port 48 which will give the advantage of the on/off time periods to be independent of the fall time of the EMF generated by the thermocouple 46. When the microswitch 28 is again operated by the projecting part of the cam surface 27, the valve 24 will close and the main burner represented by the ports 15 will be lit by the pilot flames from ports 48.

The intermittent operation is discontinued by opening of the switch 40. However, a parallel circuit consisting of conductor 36, microswitch 37, conductor 38, terminals 31, 32 and conductor 34 will keep the motor running until the cam disc has taken the position indicated in Fig. 1 and determined by the projection 44 acting on the actuating member 42 to open the microswitch 37.

From the above description of a preferred embodiment it will be apparent that the provision of pilot flames to ignite the burner during intermittent operation is advantageous in that a lot of sparks otherwise required in this mode of operation may be omitted. Moreover, the relation between the periods of lit burner and the periods of extinguished burner may be chosen independently of the characteristics of the thermocouple 46 and of the solenoid valve 45.

Claims

1. Heating arrangement comprising a burner (10) and a control device (25) for controlling the gas supply to the burner such that during a heating period the burner is alternately lit and extinguished at intervals determined by the control device, the burner (10) comprising a main venturi tube (11) communicating with a burner head (12) having a mixing chamber (17) and ports (15) for creating burner main flames, characterized in that in the burner head (12) there is provided an additional mixing chamber (49) communicating with at least one port (48) for creating a pilot flame, said additional mixing chamber (49) being separately supplied with gas via an additional venturi tube (52) in such a way as to have the pilot flame burning also during periods of extinguished burner.

2. Arrangement according to Claim 1, characterized in that the additional mixing chamber (49) is positioned centrally and that three pilot flame ports (48) are equally distributed along the periphery of the burner head (12), each port (48) communicating with the additional mixing chamber (49) by radially extending channels (50,51).

3. Arrangement according to Claim 1 or Claim 2, characterized by a manually operable gas cock (22) directly connected to the additional venturi tube (52) and connected to the main venturi tube (11) via a valve (24) controlled by the control device (25), the gas cock comprising a security valve (45) operated by a thermocouple (46) positioned to be heated by one of the pilot flames.

4. Arrangement according to any of the preceding claims, characterized in that the burner head (12) is provided with a peripheral flange (55) which extends radially beyond the pilot port (48).

5. Arrangement according to Claim 4, characterized in that the peripheral flange (55) extends radially a distance that corresponds at least to the length of the pilot flame.

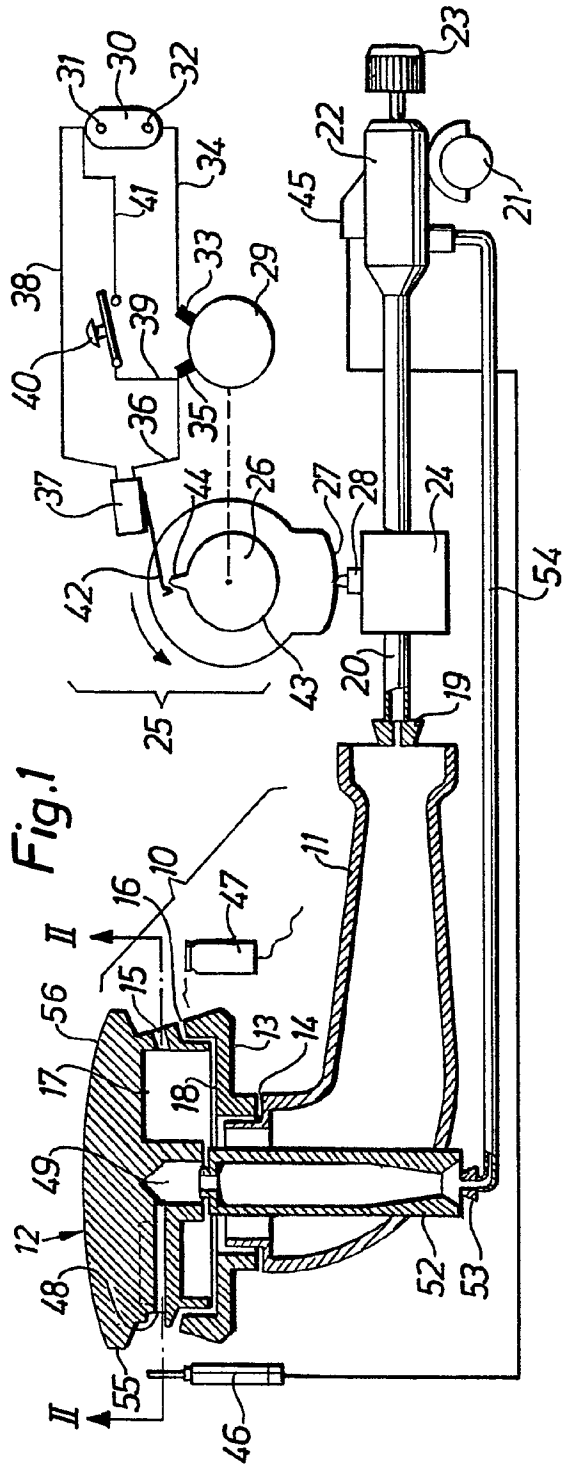
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Fig.1

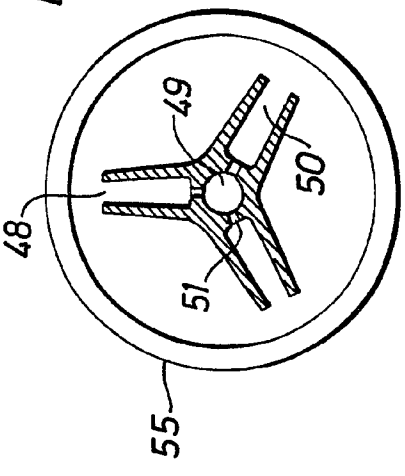
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Fig. 2

European Patent Office

EUROPEAN SEARCH REPORT

0081470
Application number

EP 82 85 0228

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. ³)
D,A	FR-A-2 418 910 (AKTIEBOLAGET ELECTROLUX) *Claim 1; figure 1*	1	F 23 N 5/22 F 23 D 13/10 F 23 C 3/08
A	DE-C- 524 547 (VOSSWERKE A.G.) *Figures 1,2*	1,3	
A	US-A-2 499 707 (H.L.WARREN) *Figure 2*	1,2,4,5	
A	FR-A- 783 565 (R.DUBOIS) *Figures 1,2*	4,5	
A	DE-C- 306 213 (W.KREFFT A.G.) *Figures 1,2*	4,5	TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	DE-C- 335 942 (DEUTSCHE PATENT-GRUDEOFEN-FABRIK WALTER RIESCHEL & CO.)		F 23 D F 23 N F 23 C
A	DE-C- 580 338 (J.H.WINDEMÜLLER)		
A	DE-B-1 251 490 (ET. SOURDILLON, MATRICAGE ET ROBINETTERIE DE PRECISION S.A.)		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	02-03-1983	THIBO F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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