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OIL OR GAS BURNER COMPRISING A DEVICE FOR CONTROLLING THE AIR SUPPLY IN THE BLOWING APERTURE OF SAID BURNER

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FIG. 1.

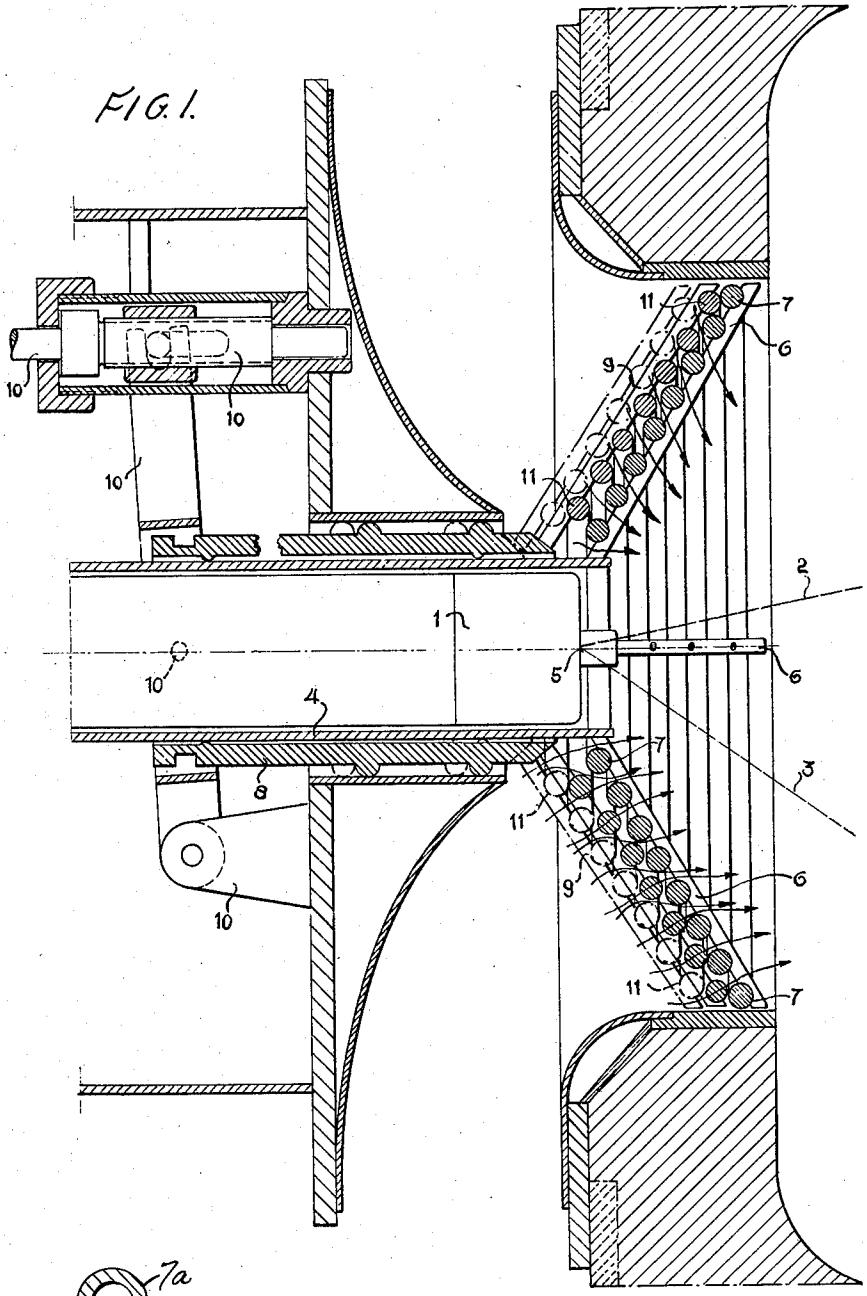




FIG. 2

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OIL OR GAS BURNER COMPRISING A DEVICE FOR CONTROLLING THE AIR SUPPLY IN THE BLOWING APERTURE OF SAID BURNER

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3 Claims. (Cl. 158—1.5)

The present invention relates to a fuel burner (oil or gas), provided with a device for controlling the air supply in the blowing aperture of said burner, said blowing aperture being concentrically mounted around the burner.

The control of the amount of combustion air must be proportional to the amount of fuel. This can be obtained in several ways, however, nearly all ways make use of controlling members (valves, scoops and the like) which are positioned at some distance in front of the actual blowing aperture or jet. By this fact the velocity and the turbulence decrease proportionately in the actual blowing aperture or jet, also called throat, when the amount of air is decreased.

In order to obtain a well shaped flame and an efficient combustion one of the principal requirements is a close mixing of the air and the atomised fuel and this requirement is closely related to the velocity, the direction and the turbulence of the air. It is possible to keep the velocity in the throat equal when using different amounts of air by adjusting the section of the throat (flexible throat). This, however, is not sufficient and cannot be easily carried out, because of the turbulence and also the direction of the air supplied at a low load nevertheless show considerable deviation at full load, which is expressed in a less stable and less efficient flame.

The object of the present invention is to provide a device with which the velocity, the turbulence as well as the direction of the flow of air can be adapted to the requirements which can be made in one burner for different amounts of air and oil or gas.

In the device according to the invention therefore, means are provided at the exit of the air blowing aperture, which can be moved with regard to each other and which are provided with such apertures that at full load the average air flow is moving therethrough substantially in an axial direction and that when the means move more towards each other the diameter of the throat decreases and also an air flow progressively is obtained which is more radially directed inwardly.

A detailed description of my invention will now be given in conjunction with the appended drawings in which:

Figure 1 is a longitudinal cross-section through an oil burner on the air controlling device comprising my invention.

Figure 2 is a cross-section of a hollow coaxial ring.

In the drawing an embodiment of the device according to the invention is described by way of examples for an oil burner. The solid portion of the air controlling device shows the position for the lowest air supply, the dotted portion of the air controlling device shows the position for the largest air supply.

The burner body is indicated with 1. The dotted line 2 indicates the circumference of the cone of the fuel at lowest load. The dotted line 3 indicates the circumference of said cone at the largest load.

A sleeve 4 surrounds the burner body 1. At the end

of the sleeve 4 adjacent to the burner jet 5 a number of spoke-shaped members 6 are mounted. Said members 6 support a set of coaxial rings 7 which form the mantle of a truncated cone. The top of said cone lies on the axis of the burner body 1.

A second sleeve 8 is mounted concentrically around said sleeve 4 and is adapted to slide lengthwise. The sliding movement of said sleeve can be carried out by means of suitable members which are indicated at 10.

A number of spoke-shaped members 9 which also extend with an inclination are mounted on the end of the slidable sleeve 8 adjacent to the jet 5. Said members 9 support some coaxial rings 11 which constitute with each other a second truncated cone. The top of said second cone is also situated on the axis of the burner body. The top angles of said two conical surfaces, however, differ over such an amount that when said rings slide the outmost rings of both sets of rings will completely close first (side upper part of drawing), and afterwards the more inwardly positioned rings etc. The air can be fed to the throat having pressurized air control through an air box or also immediately from the atmosphere. Cooling of the sets of ring-shaped members 7, 11 takes place by means of the air flowing alongside, however, both sets can be carried out by means of ring-shaped tubes through which water or another coolant flows such as hollow tube 7*a*. One of said sets of ring-shaped members also can be carried out as tubes. The embodiment last mentioned is preferred for use in very hot heavily loaded burners.

In most cases it will be sufficient to cool the hollow ring-shaped tubes lying nearest to the flame which in the present case is the fixed cone. In its open position the control member exclusively is a turbulence generator. The average direction of the air flow is axial. The turbulences are very steady by the application of torus-shaped rings and are beneficial for a close mixing of the air and the fuel mist.

In the partly closed position the passage is decreased from the outside so that a decreased amount of air flows through a relatively narrower section and secondly a radially and inwardly directed flow is generated. The turbulence therefore remains very good and the direction of the air is adjusted to the smaller flame.

In the completely closed position said change is made in the same direction. However, an aperture around the burner remains free through which a strongly decreased amount of air can flow which is strongly radially directed. Said amount of air corresponds to the lowest load of the oil burner. In dependence from the embodiment said lowest load should be approximately $\frac{1}{10}$ to $\frac{1}{3}$ of the full load.

What is claimed is:

1. An oil or gas burner comprising, in combination, a fuel nozzle, means for controlling and directing combustion air positioned concentrically around said nozzle, said means comprising a fixed cone-shaped member and a second cone-shaped member in substantial nested relation; means mounting said second cone-shaped member for movement toward and away from the fixed member, each of said two members comprising a number of concentric toroidal rings forming ring-shaped openings between said rings and arranged so that on moving the movable member away from the fixed member the effective flow area through the openings increases and the general direction of the outflowing air continuously changes at the same time from substantially in a radially inward direction to a substantially axial direction, thereby providing proper conditions of turbulence, direction and flow area for the combustion air stream with respect to the fuel nozzle and rate of fuel supply.

2. The device of claim 1 in which the inner cone-

shaped member forms a greater angle with respect to the axis of the burner.

3. The device of claim 2 in which the torus-shaped rings which are nearest to the fuel cone, are tubes through which a coolant can be fed.

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