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MEANS FOR CONTROLLING THE COMBUSTION OF HYDROCARBONS

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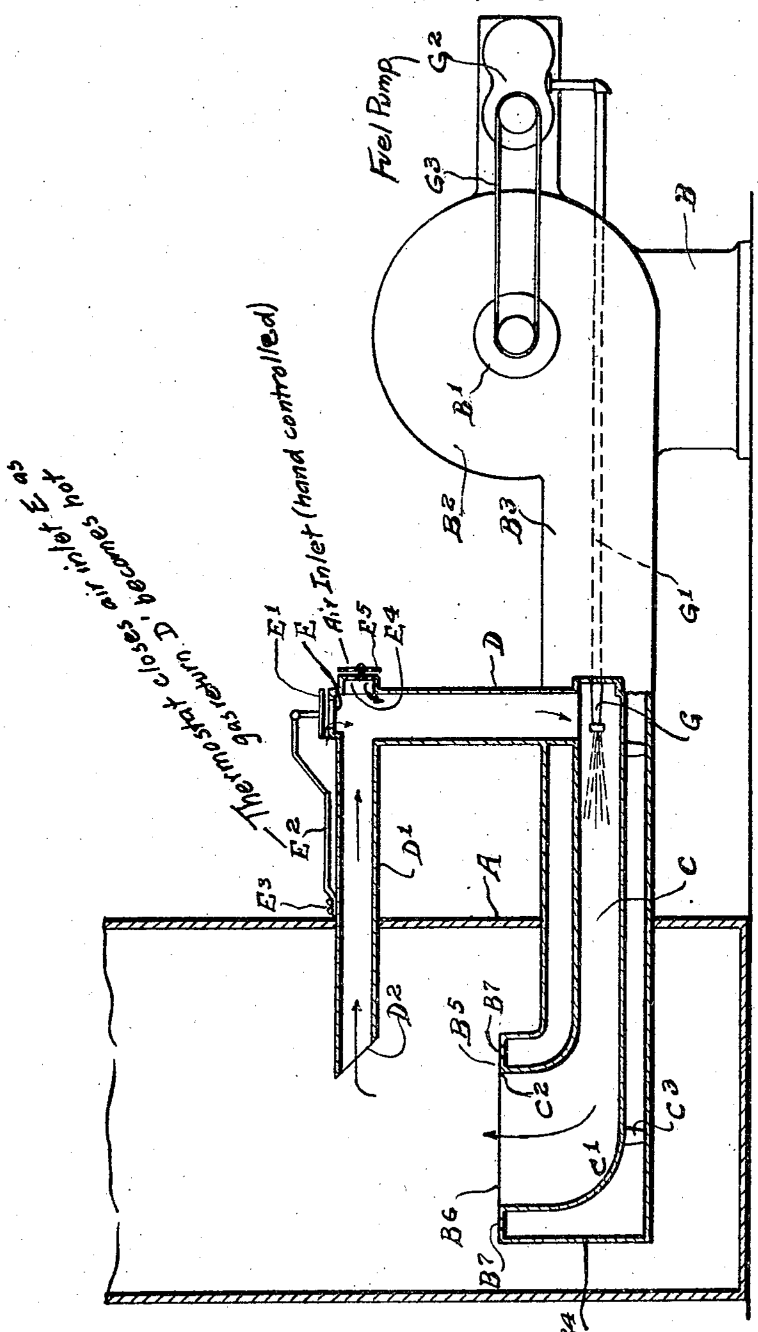

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MEANS FOR CONTROLLING THE COMBUSTION OF HYDROCARBONS.

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My invention relates to a device for burning hydrocarbons, and is particularly adapted for burning liquid hydrocarbons in connection with domestic heating plants. One object is the provision of a simple and easily manufactured combustion device with a minimum number of moving parts. Another object is the provision of a combustion device in which hydrocarbons may be burned substantially noiselessly. Another object is the provision of means for returning a circulation of the exhaust gases of combustion into the inflowing mixture, in order to quiet the noise of combustion. Another object is the provision of both automatic and manual means for regulating and varying the relative proportions of air and exhaust gases delivered to the zone of combustion. Another object is the provision of automatic means for varying the relative proportions of air and exhaust gases from a maximum of air at the initiation of combustion to a minimum of air during normal full combustion. Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawing, which is a side elevation of my device with parts in section. Like parts are indicated by like symbols throughout the drawing and specification.

A indicates any suitable furnace with which my burner may be used. Since the details of the furnace form no part of the present invention, it is merely diagrammatically indicated.

B is any suitable base or support, on which is mounted a motor B^1 with which is associated a fan chamber B^2 having a tangential exhaust passage B^3 which extends into the furnace A and terminates in a casing B^4 therein. B^5 indicates a top for said casing, having a main central aperture B^6 surrounded by a plurality of smaller apertures B^7.

C indicates a longitudinal passage member mounted within the passage B^3 and terminating in a mixing chamber C^1, the upper edge C^2 of which engages the inner edge of the aperture B^6. C^3 are any suitable supporting or spacing members.

In connection with the outer end of the passage C is the passage D, herein shown as generally vertical and provided with a lateral extension D^1 passing through the wall of the furnace A. The inner end of this extension D^1 is positioned and shaped, for example as shown at D^2, to receive exhaust gases of combustion, and return them to the passage C.

E indicates an air inlet aperture positioned in the member D or in the extension D^1. It is provided with the closure member E^1 mounted on a thermostatic strip E^2, herein shown as secured as at E^3 to the wall of the members D^1. It will be understood that when the furnace is cold, the closure E will preferably remain open. I also illustrate an auxiliary air inlet E^4, which may be provided with any suitable manually operable closure E^5.

G is a fuel nozzle projecting into the outer end of the passage C, and aligned with its longitudinal axis. It is supplied by the fuel line G^1 which extends from any suitable fuel source. G^2 indicates any suitable type of pump, for example a rotary pump, which may be driven from the motor B^1, for example by means of the belt G^3.

It will be realized that whereas I have described and shown a practical and operative device, nevertheless many changes may be made in size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my drawing and description to be taken as in a broad sense illustrative or diagrammatic rather than as limiting me to the specific description and showing.

The use and operation of my invention are as follows:

At the initiation of combustion, the thermostatic element E^2 holds the closure E^1 withdrawn a substantial distance from the air inlet E. As a result, a substantial current of air flows in through the aperture E and through the passage C. For ignition I may employ any suitable means commonly known in the art, for example a torch or pilot light, the ignition means being not shown, since the details do not form part of the present invention. As ignition begins some of the exhaust gases of combustion flow into the lateral extension D^1 and heat the thermostatic member E^2. As it is heated it closes the aperture E^1, thus decreasing the volume of the inflowing air, and increasing the volume of the exhaust gases of combustion returned to the passage C.

It will be understood that the return of the exhaust gases has the double function of heating the hydrocarbon and of reducing and practically eliminating the noise of combustion. It is not necessary to go into the causes of this silencing effect, but it is a fact that the use of a return circuit of exhaust gases does practically eliminate the noise of combustion, the mixtures so formed burning silently.

I preferably so arrange the thermostatic element that it will completely close the air inlet E after a predetermined period of combustion. In order to provide a minimum of air I may employ the supplemental and manually controlled air inlet E^4. Whereas the circulation of air and exhaust gases into and through the passage C is effected by natural draft, I prefer to provide a secondary air supply which is or may be constantly controlled, for example by the employment of a blower. This secondary air is admitted into the zone of combustion through the apertures B^7 in the top B^5 of the casing B^4, whereas the primary mixture of hydrocarbon and exhaust gases, with whatever air is admitted to it through the apertures E and E^4, enters the zone of combustion through the main central aperture B^6.

The details of the admission or spraying of the oil are not important in the present invention, but I indicate a rotary pump driven by the motor B^1, which delivers fuel under pressure along the line G^1 to the spraying nozzle G. The finely divided hydrocarbon so delivered in liquid form is mingled with the heated exhaust gases and is to a great extent vaporized or gasified thereby, prior to reaching the actual zone of combustion.

Although the thermostatic regulation above described is particularly important in connection with the initiation of combustion, it will be realized that a decrease in the temperature of the exhaust gases returned will always increase the primary air supply admitted through the aperture E.

Although I have illustrated thermostatic means for effecting the regulation of the flow of return gases and air, it will be realized that I do not limit myself to thermostatic means. Any automatic control for effecting such regulation may be employed, and, for example, any automatic means for cutting in and increasing circulation of exhaust gases after the initiation of combustion.

I claim:

1. In a heating device a combustion chamber, a fuel line, an air line, and a passage member adapted to circulate exhaust gases for mixture with the fuel and air, and control means adapted initially to restrict such circulation of exhaust gases and adapted automatically to increase the circulation of said exhaust gases, after the initiation of combustion.

2. In a heating device a combustion chamber, an air inlet passage in communication therewith, a fuel inlet member, a return connection adapted to direct a circuit of the exhaust gases of combustion into said air inlet passage, and automatic means adapted at the same time to decrease the air circulation and increase the exhaust gas circulation.

3. In a heating device a combustion chamber, an air inlet passage in communication therewith, a fuel inlet member, a return connection adapted to direct a circuit of the exhaust gases of combustion into said air inlet passage, and thermostatic means adapted at the same time to decrease the air circulation and increase the exhaust gas circulation.

4. In a heating device a combustion chamber, an air inlet passage in communication therewith, a fuel inlet member, a return connection adapted to direct a circuit of the exhaust gases of combustion into said air inlet passage, and means for at the same time decreasing the volume of the inflowing air and increasing the volume of the circulated exhaust gases.

5. In a heating device a combustion chamber, an air inlet passage in communication therewith, a fuel inlet member, a return connection adapted to direct a circuit of the exhaust gases of combustion into said air inlet passage, and automatic means for at the same time decreasing the volume of the inflowing air and increasing the volume of the circulated exhaust gases after a predetermined initial period of combustion.

6. In a heating device a combustion chamber, an air inlet passage in communication therewith, a return connection adapted to direct a return circuit of exhaust gases into the stream of inflowing air, a fuel inlet member, an inlet opening in communication with said air inlet passage, and automatic means for controlling it.

7. In a heating device a combustion chamber, an air inlet passage in communication therewith, a return connection adapted to direct a return circuit of exhaust gases into the stream of inflowing air, a fuel inlet member, an inlet opening in communication with said air inlet passage, and automatic means for at the same time varying the passage of exhaust gases through the return connection in inverse proportion to variations in the supply of inflowing air effected by said control.

8. In a heating device a combustion chamber, an air inlet passage in communication therewith, a return connection adapted to direct a return circuit of exhaust gases into the stream of inflowing air, a fuel inlet

member, an inlet opening in communication with said air inlet passage, control means for said air inlet passage and for said return connection adapted, at the initiation of combustion, to permit the flow of a minimum of exhaust gases and a maximum of air, and adapted automatically to decrease the flow of air and increase the return circuit of exhaust gases after the initiation of combustion.

9. In a heating device a combustion chamber, an air inlet passage in communication therewith, a return connection adapted to direct a return circuit of exhaust gases into the stream of inflowing air, a fuel inlet member, an inlet opening in communication with said air inlet passage, control means for said air inlet passage and for said return connection adapted, at the initiation of combustion, to permit the flow of a minimum of exhaust gases and a maximum of air, adapted automatically to decrease the flow of air to a predetermined minimum and increase the return circuit of exhaust gases to a predetermined maximum after a predetermined period of combustion.

10. In a heating device a combustion chamber, an air inlet passage in communication therewith, a fuel inlet member, a return connection adapted to direct a circuit of the exhaust gases of combustion toward the combustion chamber, and automatically operative unitary means for inversely varying the flow of the air and of the exhaust gases, respectively, through said air inlet passage and return connection, after the initiation of combustion.

Signed at Washington, in the District of Columbia, this 8th day of November, 1926.

JAMES L. BREESE, Jr.