April 15, 1930. P. R. DELLING 1,754,546

FLUID FUEL COMBUSTION

Filed May 22, 1926

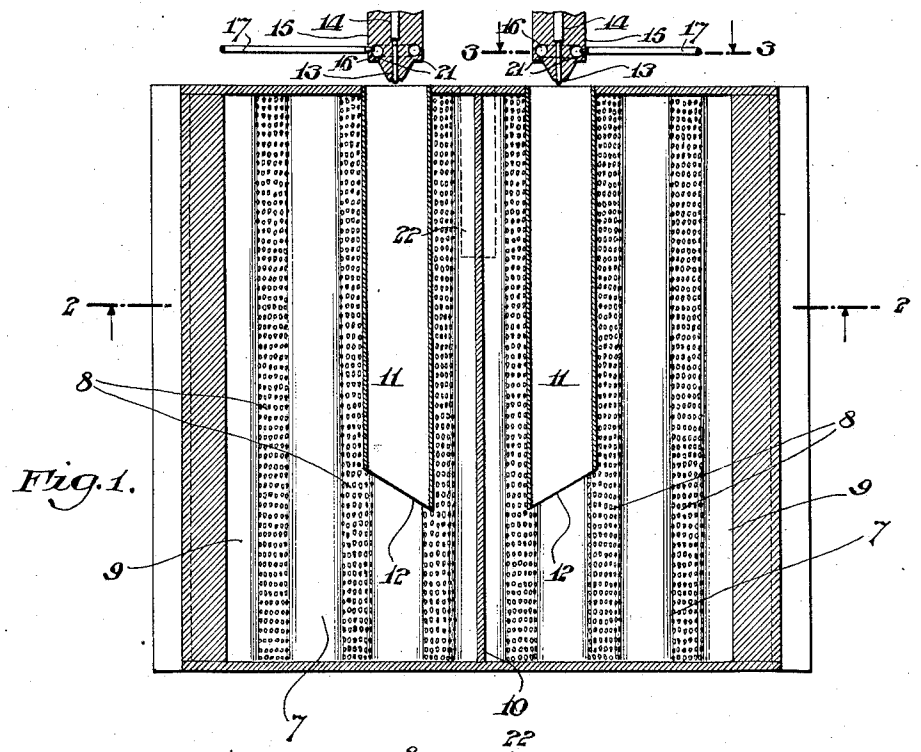


Fig. 1.

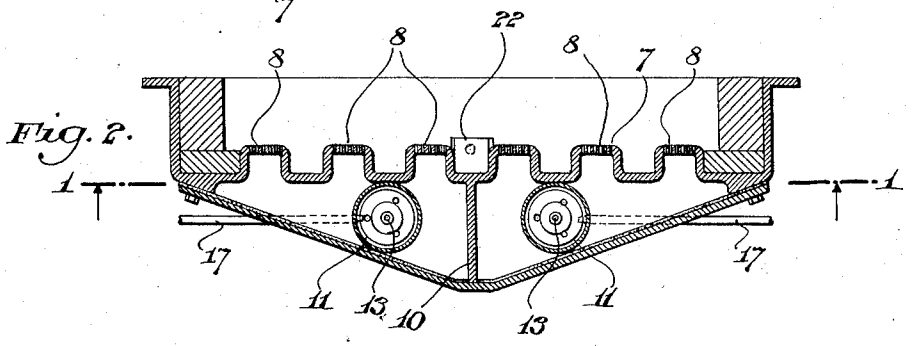


Fig. 2.

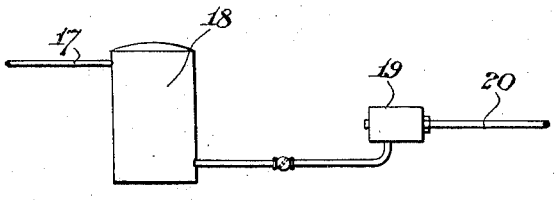


Fig. 4.

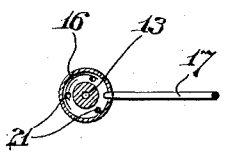


Fig. 3.

Inventor:
Paul R. Delling,
By Mott Corbin dale
Attorney.

Patented Apr. 15, 1930 1,754,546

UNITED STATES PATENT OFFICE

PAUL R. DELLING, OF HADDON TOWNSHIP, CAMDEN COUNTY, NEW JERSEY

FLUID-FUEL COMBUSTION

Application filed May 22, 1926. Serial No. 110,836.

The invention relates to fluid fuel combustion. The object is to provide improved method and means for delivering the fluid fuel and air to a mixing and distribution chamber and thence to and through a vertical burning grate.

The invention comprises modifications and improvements in my pending application Serial No. 34,788, filed June 4, 1925, in which application the air induction and mixing tubes are shown as horizontally arranged and in which the action of the discharging fuel vapor is relied upon to introduce the necessary air into the tube and mixing chamber to produce the desired combustible mixture.

In accordance with the present invention, the mixing tubes are directed vertically, and a plurality of fuel discharge jets and a plurality of tubes are employed in separated mixing chambers, all delivering to the same grate.

Special method and means are also provided for the positive introduction of air or other fluid medium into the tubes, independently of the action thereon, of the inflowing fuel vapor, and independently of the special formation or cross-section of the tubes. In other respects, the present method and means are substantially the same as shown in said pending application.

Referring to the drawings, which illustrate merely by way of example, suitable means for effecting the invention:—

Fig. 1 is a vertical section on the line 1, 1 of Fig. 2.

Fig. 2 is a horizontal section on the line 2, 2 of Fig. 1.

Fig. 3 is a horizontal section on the line 3, 3 of Fig. 1.

Fig. 4 is a diagrammatic view indicating the compressed air tank and the air pump driven by the engine shaft.

Similar numerals refer to similar parts throughout the several views.

The grate 7 is arranged vertically and is of corrugated or channeled formation; the corrugations preferably extending vertically. The courses of perforations 8 are similar to those shown in my copending application, except that in accordance with the present arrangement the courses preferably extend vertically. The mixing chamber, delivering to the grate is divided into two or more separate compartments 9, by vertically extending partition or partitions, such as 10.

Within each compartment 9 is provided a tube 11 extending downwardly from the top of the compartment and ending and discharging at some distance from the bottom thereof. The discharge opening 12 of the tube is preferably inclined to the horizontal, as shown.

A fuel vapor nozzle 13 is positioned above the top opening of the tube 11 and delivers downwardly thereto. A certain amount of air is introduced into the open top of the tube by the induction action of the inflowing fuel vapor. It will be understood that the fuel nozzle 13 is supplied with fuel vapor under pressure by the pipe 14 connected with a source of fuel under pressure, not shown. The formation 15 surrounding and supporting the nozzle 13 is provided with an annular channel 16, connected by pipe 17 to a supply of compressed air, steam or other fluid under pressure. I have shown for example, the compressed air container or reservoir 18, supplied by the pump 19, driven in any suitable way, preferably by the engine shaft 20. Communicating with the annular channel 16 are three or more discharge vents 21, adapted to deliver fluid jets or streams around or flanking the jet of fuel vapor, into the mouth of the tube 11.

By this arrangement a positive flow of air, steam or other fluid medium is secured into the tube. This may be controlled, as for example by controlling the pressure in tank 18. By this method inflow of air is not dependent upon the action of the inflowing fuel vapor, nor upon the size or shape of the tube mouth, but can be controlled independently of both. For example, after the supply of fuel vapor has been shut off, and even after the engine is stopped, the air or other fluid will flow from the vents 21 through the tube and into the mixing chamber, until the pressure in the tank 18 is exhausted. This insures the cleansing or clearing the tube and also the mixing chamber of any residue of fuel. And when the engine is again started, air or

other fluid will flow from the vents 21 into the tube and mixing chamber, even before the fuel vapor is turned on, thus again sweeping out any residual fuel that may be in the tube or mixing chamber. This arrangement and method effectually prevents any tendency to back-firing, or premature combustion.

The vertical arrangement of the tube and of the mixing chambers has been found most efficient in operation; in that the first discharge of combustible mixture from the mouth 12 of the tube will tend to flow gently through the middle part of the grate and ignite from the pilot as at 22. As the pressure of the combustible mixture builds up in the mixing chamber 9, the burning will gradually extend over the entire area of the grate.

It will be understood that steam, in combination with, or in place of air, or other fluid under pressure, may be supplied to the channel 16 and discharge vents 21, with satisfactory results.

What I claim is:—

1. In a fluid fuel combustion system, the combination of a burning grate having its vents arranged in a vertical plane, means forming a mixing and distributing chamber associated therewith, a mixing tube delivering downwardly to said chamber, a source of fuel supply under pressure, a fuel nozzle connected thereto and delivering to said tube and arranged to introduce air with the fuel by the inductive action of the fuel, and means for causing an independent and positive flow of medium from a different source under pressure into said mixing tube.

2. The combination with a grate having burner vents arranged in a substantially vertical plane, means, including the grate, forming a fuel and air mixing chamber, a mixing tube open at the top to the atmosphere and delivering downwardly into the mixing chamber, a nozzle formation positioned above the open top of the tube and provided with a fuel vent delivering downwardly into the tube and connected with a fuel supply under pressure, said nozzle formation also provided with an annular chamber connected with a source of fluid medium under pressure, and provided with vents flanking the fuel vent and discharging downwardly into said mixing tube.

3. The combination with a grate having burner vents arranged in a substantially vertical plane, means, including the grate, forming a fuel and air mixing chamber, a mixing tube open at the top to the atmosphere and delivering downwardly into the mixing chamber, a nozzle formation positioned above the open top of the tube and provided with a fuel vent delivering downwardly into the tube and connected with a fuel supply under pressure, said nozzle formation also provided with an annular chamber connected with a source of fluid medium under pressure, and provided with vents flanking the fuel vent and discharging downwardly into said mixing tube, and means for controlling the delivery of said fluid medium independently of the delivery of fuel.

PAUL R. DELLING.