

Dec. 24, 1935.

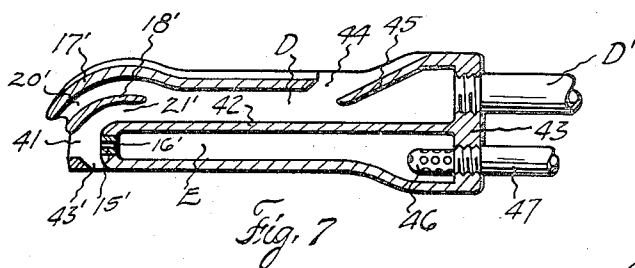
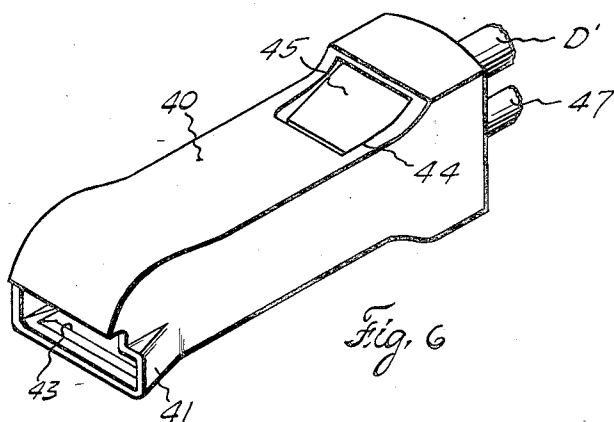
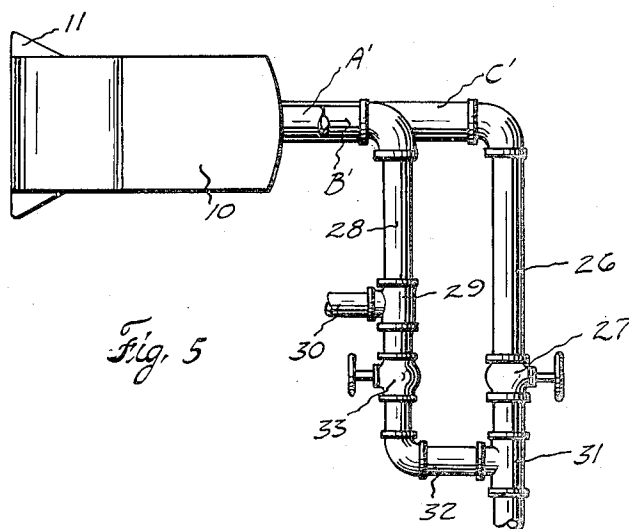
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2,025,331

FUEL BURNER

Filed May 26, 1933

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,025,331

FUEL BURNER

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Application May 26, 1933, Serial No. 673,004

8 Claims. (Cl. 158—11)

This invention relates to new and useful improvements in fuel burners.

One object of the invention is to provide an improved fuel burner which will be free from adjustable parts and which will not require frequent regulation and in which more efficient mixing and combustion will be produced, and also whereby quicker heating will be carried out.

A particular object of the invention is to provide a burner which will not fluctuate or buck from variations in the draft or exhaust from an engine.

Another object of the invention is to provide means for directing liquid fuel into the atomizing stream of steam or gas at a point where the pressure of the latter is highest and also which acts to deflect the gases rising from liquid fuel and direct them into the fuel stream at the point of combustion.

Still another object is to provide particular air openings and ducts, whereby efficient breathing is produced, a proper admixture of air and fuel is made, and also whereby waste fuel is forced upward into the fuel stream.

An important object of the invention is to provide a combination burner of a simple nature for burning liquid and gaseous fuels and atomizing the liquid fuel with a pressure fluid, in which the fuels may be individually or conjointly used, and wherein a thorough mixing is had, waste is eliminated and undesirable results from draft variations are prevented.

A construction designed to carry out the invention will be hereinafter described, together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown, and wherein:

Figure 1 is a perspective view of a combination burner constructed in accordance with the invention,

Figure 2 is a front elevation of the same,

Figure 3 is a longitudinal vertical sectional view of said burner,

Figure 4 is a horizontal cross-sectional view taken on the line 4—4 of Figure 3,

Figure 5 is an assembly view showing the burner connected with its various supply pipes,

Figure 6 is a perspective view of another form of burner embodying the invention, and

Figure 7 is a longitudinal vertical sectional view of the same.

In the drawings the numeral 10 designates a

burner head or body having at its forward end a flaring nozzle 11. At the central portion of the body transverse webs or partitions 12 and 13 extend forwardly and longitudinally of the body from the rear wall 14. These partitions divide the burner into three longitudinal ducts or channels, whereby an upper channel A, a central channel B, and a lower or bottom channel C, are formed. The forward portion of the body is reduced vertically and the partitions are offset so as to correspondingly reduce or restrict the ducts. It will be noted that the ducts are not reduced or restricted transversely, but only vertically of the burner head. This permits the supply streams to enter the head and causes a transverse spreading of the same after entering.

An oil supply pipe A' is screwed into the back 14 to supply oil to the duct A, while a steam supply pipe B' and a gas supply pipe C' are similarly mounted to supply steam to the duct B and gas to the duct C. It is pointed out that other fluids may be supplied and the invention is not to be limited to any particular kind of fluid. As an illustration, gas could be supplied to the duct B and put under sufficient pressure to atomize a low pressure gas supplied to the duct C, or a gas generated from a mixture of oil and gas could be supplied to the duct A; however, the burner is particularly designed for using oil in the uppermost duct.

The duct B terminates short of the front end of the head and substantially at the rear portion of the nozzle 11. I prefer to cast the head 10 as an integral body and as a manufacturing expedient and mold in the front end of the duct an orifice bar or plate 15, which extends substantially across the duct and is provided with spaced openings or orifices 16. These orifices are comparatively small so that jets or fine streams of pressure fluid will be ejected from the duct B through the nozzle 11. This permits the bar to be drilled or formed and then placed in the mold, whereby it will not be necessary to drill the orifices after the casting is complete.

I provide an overhanging hood 17 located at the top and over the nozzle opening at the front end of the duct A. Between the hood and the end of the duct B a transverse baffle 18 is cast in the head and this baffle is curved longitudinally of the head so that its lower end overhangs the front end of the duct B and terminates just above the orifices 16. By this arrangement an upper passage or channel 20 is formed between the hood and the baffle, while a lower passage 21 is formed between the baffle and the partition 12. Just in

rear of the baffle a transverse air flue 22 is formed in the head and the rear wall 23 of this flue is inclined forwardly and downwardly toward the partition 12 to form a deflector for the liquid entering the said duct.

Below the forward end of the partition 13 a transverse air opening 24 is provided in the bottom of the head 10 so as to admit air to the rear of the nozzle 11. This opening is inclined forwardly and a transverse baffle flange 25 contiguous to the rear edge of the opening extends upwardly in the duct C. This baffle acts to deflect the gaseous fluid upwardly into the nozzle and away from the opening 24. The nozzle forms a mixing chamber for the various fuel fluids and the air.

In explaining the operation of the burner, it will be assumed that oil is being supplied to the duct A, steam to the duct B, and gas to the duct C. The steam, being under pressure, is discharged from the orifices 16 in jets or streams and thus becomes the atomizing means. The deflector 23 will cause the oil to travel along the upper side of the partition 12 and the air entering the flue 22, together with the baffle 18, will force the oil into the nozzle 11, where it will be admixed with the steam. When the burner is in operation the head 10 will become hot and, therefore, gases will arise from the oil as it travels forwardly on the partition 12. These gases will be carried over the baffle 18 into the channel 20, while the air, which is drawn through the flue 22 by the suction created by the steam, will be carried into the channel 21 and deflected downwardly by the baffle.

The suction created by the atomization of the steam will draw the gas forwardly through the duct C and it will be deflected upwardly into the steam by the baffle 25. Air will be drawn upwardly through the opening 24 and this will admix with the gas and also carry up into the steam jets any surplus oil which might tend to drip from the front end of the duct B. It is pointed out that the baffle 18 prevents draft variations from sucking the oil out of the burner head and the two channels 20 and 21 prevent bucking or fluctuation by co-acting with the baffle to properly distribute the air. The flue 22 acts as a breather and a steady and intense flame is constantly produced. The hood 17 overhanging the baffle 18 protects the latter from intense heat and also acts to deflect the air currents downwardly into the atomizing stream, as well as protecting such stream from counter air currents.

As before stated, considerable variation may be made in the fluids supplied to the ducts. In Figure 5 the gas pipe C' is connected with a gas riser 26 including a valve 27. The steam pipe B' is connected with a steam riser 28, which in turn is connected with a T 29 mounted on the end of a steam supply pipe 30. A T 31 in the gas riser 28 below the valve 27 is connected with the bottom of the T 29 by a branch pipe 32 including a valve 33. When the valve 33 is closed gas will not pass into the steam pipe. However, by cutting off the steam supply and opening the valve 33, gas may be supplied to the duct B, as well as to the duct C. Owing to the small orifices 16, the gas from the duct B will be ejected in atomizing streams and thus becomes the pressure fluid. As another alternative, gas instead of steam could be supplied to the pipe 30 and this gas could be placed under a higher pressure than the gas supplied by the pipe 26. Simply by open-

ing and closing valves, the fuel and pressure supply is easily and readily controlled. Either oil or gas may be burned separately or both fuels may be used and steam or any other atomizing fluid, such as gas or air, may be utilized as desired.

The burner illustrated in Figures 1 to 5 is more particularly designed for oil field boilers, stills, open air forges, furnaces, and the like, but its use is not to be limited thereto. In Figures 6 and 7, I have shown another form of burner which is particularly designed for locomotives, but of course may be used wherever found desirable. This burner comprises an elongated head or body 40 having a transversely flared nozzle 41 at its forward end. A transverse partition 42 extends forwardly and longitudinally in the head from the rear wall 43 and divides the head into an upper duct D and a lower duct E. The head has an overhanging hood 17', a curved baffle 18', and channels 20' and 21', all of which parts are arranged and function substantially the same as the elements 17, 18, 20 and 21.

The upper duct D is the oil or fuel duct, while the lower duct E is the steam or pressure fluid duct. A bar 15' having orifices 16' like the bar 15 is cast in the front end of the duct D. An air opening 43' similar to the opening 24 is provided in the bottom of the nozzle at the front of the duct E. An air flue 44 is provided in the top of the duct D and has a deflector wall 45, similar to the flue 22. However, the flue 44 is located nearer the supply pipe D' than is the flue 22 to its supply pipe. This causes the oil to travel a greater distance along the partition 42 than in the combination burner, whereby the gases are given full opportunity to rise out of the oil and the oil is more thoroughly pre-heated, thereby requiring less oxygen than in the combination burner. The exhaust from the locomotive or engine does not interfere with the operation of this burner, as the baffle 18' prevents oil suction, and co-acting with the hood, channels, and air flue, eliminates fluctuation and bucking, as well as providing for breathing. A strainer 46 may be fastened in the duct E at the discharge end of the steam supply pipe 47.

The description which has been given recites more or less detail of a particular embodiment of the invention, which is set forth as new and useful, however, I desire it understood that the invention is not limited to such exact details of construction, because it is manifest that changes and modifications may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent, is:

1. A fluid fuel burner comprising, a burner head having extending therethrough a fuel duct for receiving and conducting a fluid fuel and a second duct for receiving and conducting a gaseous fluid under pressure, the fuel duct being provided with an air inlet opening intermediate its ends, and a baffle at the discharge end of the fuel duct overhanging and spaced from the discharge end of the second duct for deflecting the fluid fuel downwardly into the gaseous fluid discharged from the second duct and for deflecting air currents away from the discharge end of the second duct and into the flame.

2. A fluid fuel burner comprising, a burner head having extending longitudinally therein a fuel duct for receiving and conducting a fluid fuel and a second duct for receiving and con-

ducting a gaseous fluid under pressure, the second duct having mixing orifices at its discharge end, and a transverse baffle in the front end of the fuel duct overhanging the mixing orifices of the second duct for directing the fuel downwardly into the jets of gaseous fluid discharged from said orifices, the fuel duct having an air admission opening intermediate its ends and the head having a channel above said baffle for conveying air from the fuel duct to the flame.

3. A fluid fuel burner comprising, a burner head having extending longitudinally therein a fuel duct for receiving and conducting a fluid fuel and a second duct for receiving and conducting a mixing fluid, the second duct having mixing orifices at its discharge end, the fuel duct having an air admission opening intermediate its ends, a nozzle extending forwardly from the orifices of the second duct, and a baffle curved longitudinally of the fuel duct and extending across the upper end of the nozzle and overhanging the orifices of the second duct for separating the air and fuel which are admitted to the fuel duct.

4. A fluid fuel burner comprising, a burner head having extending longitudinally therein a fuel duct for receiving and conducting a fluid fuel and a second duct for receiving and conducting a mixing fluid, the second duct having mixing orifices at its discharge end, the fuel duct having an air admission opening intermediate its ends, a nozzle extending forwardly from the orifices of the second duct, and a baffle curved longitudinally of the fuel duct and extending across the upper end of the nozzle and overhanging the orifices of the second duct for separating the air and fuel which are admitted to the fuel duct, the nozzle having an opening at its bottom for admitting air at atmospheric pressure and directing the same upwardly into the mixed fuel stream.

5. A fluid fuel burner comprising, a burner head having extending longitudinally therein a fuel duct for receiving and conducting a fluid fuel and a second duct for receiving and conducting a mixing fluid, the second duct having mixing orifices at its discharge end, the fuel duct having an air admission opening in its top intermediate its ends, a nozzle extending forwardly from the orifices of the second duct, and a baffle curved longitudinally of the fuel duct and extending across the top of the nozzle opening and overhanging the orifices of the second duct for separating the air and fuel which are admitted to the fuel duct, said nozzle having a hood spaced above the baffle and curved downwardly over the

latter for deflecting into the flame the atmospheric air flowing through the fuel duct.

6. A fluid fuel burner comprising, an elongated burner head having extending therein a longitudinal fuel duct for receiving and conducting fluid fuel and a longitudinal second duct for receiving and conducting a mixing fluid, a nozzle at the front end of the second duct having an air admission opening in its bottom, an air flue in the fuel duct, and a transverse baffle overhanging the nozzle opening and the front end of the second duct for directing the fluid fuel downwardly into the mixing stream discharged from the second duct, said nozzle having a hood spaced above and overhanging baffle for directing air from the fuel duct into the flame.

7. A fluid fuel burner comprising, an elongated burner head having a nozzle at its forward end, a longitudinal fuel duct in the upper part of the head for receiving and conducting a fluid fuel, said fuel duct having an air admission opening which is open to the atmosphere, a second duct extending longitudinally in the central portion of the head for receiving and conducting a mixing fluid, a gas duct extending longitudinally at the bottom of the head for receiving and conducting a fuel gas, mixing orifice at the front end of said second duct located at the rear of the nozzle, and a transverse baffle at the front end of the fuel duct curved downwardly in and spaced from the top of the nozzle for separating the liquid fuel and the air admitted to the fuel duct.

8. A fluid fuel burner comprising, an elongated burner head having a nozzle at its forward end, a longitudinal fuel duct in the upper part of the head for receiving and conducting a fluid fuel, said fuel duct having an air admission opening which is open to the atmosphere, a second duct extending longitudinally in the central portion of the head for receiving and conducting a mixing fluid, a gas duct extending longitudinally at the bottom of the head for receiving and conducting a fuel gas, mixing orifices at the front end of the second duct located at the rear of the nozzle, and a transverse baffle at the front end of the fuel duct curved downwardly in and spaced from the top of the nozzle for separating the liquid fuel and the air admitted to the fuel duct, said nozzle having a hood overhanging and spaced above the baffle for conducting the air into the flame, the nozzle also having an air admitting opening at its bottom for directing air at atmospheric pressure upwardly into the mixed fuel stream.

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