

UNITED STATES PATENT OFFICE.

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FUEL-FEEDING SYSTEM.

1,238,633.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FRANK CALDWELL, a citizen of the United States, and a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Fuel-Feeding Systems, of which the following is a specification.

This invention relates to that class of hydrocarbon combustion devices in which the air and oil are used under pressure to produce the burning or heating medium, and the object of the invention is to provide means whereby the hydrocarbons that include volatile oils or various gases are used in an initial or a primary mixing-tank and with an advancing or accelerating air-pressure back of them and then such accelerated air and oil admixture passed onward into one branch of a Y-joint whose other branch accommodates an independent air-supply under pressure and then said admixture and independent air-supply passed onward into a coil or worm whose serpentine or spiral bore forms a circuitous passage-way that is adapted to cause a churning flow and thereby thoroughly mix the said first admixture and the said independent air-supply before their final passage into a distributing discharge-nozzle, the latter having a second independent air-supply under pressure adapted to enter its rear end and pass through the same adjacent the admixed air-and-oil passage so that the exit end or mouth of said discharge-nozzle shall form a final confluent point under suitable control for the peculiar vesicle vapor that now emits beyond for ignition and the combustion purpose desired.

The details of the invention will be more fully described hereinafter and then more particularly pointed out in the claims.

In the accompanying sheet of drawings, Figure 1 is a composite perspective view of my invention in its preferred form and showing an initial air-pressure tank, an initial, air-charged oil supply-tank, an air and oil initial, reaction or mingling tank under mechanical or agitator control, initial admixture-carrying pipe and independent air supply, special mixing coil and final independent air-supply and admixture receiving and discharge nozzle; Fig. 2, a longitudinal section of the special Y-branch joint for receiving the first independent air-supply and

admixture after the departure of the latter from the main mixing or mingling tank and delivering the second resultant admixture to the special mixing or mingling coil; Fig. 3, a longitudinal section showing the interior structure of the final-discharge nozzle; Fig. 4, a fore end view of the said final-discharge nozzle; and Fig. 5, a transverse section of the said final-discharge nozzle taken on the dotted line *x, x*, of Fig. 3.

1 indicates a tank supplied with air under pressure from a suitable pump (not shown) through inlet-pipe 2.

3 indicates an oil supply-tank that has an oil-propelling air-pressure pipe 4 that leads from or taps a conductor-pipe 5 that, in turn, leads from or taps the said air-tank 1.

6 indicates an oil exit-pipe leading from the top of the oil-tank 3 and having a valve-control 7 therein.

8 indicates a large receptacle or tank adapted to receive the oil under pressure from supply-tank 3 through pipe 6 and air under pressure from supply-tank 1 through air exit and conductor pipe 9, both pipes 6 and 9 leading into the top of the tank 8 at either side the center thereof. An agitator-blade 10 is mounted on a shaft 11 in the receptacle 8 for giving the air and oil their first admixturing and causing a due commingling of said elements, such being a mechanical one and starting the movement of the air and oil through the apparatus in what I believe and find to be the most proper manner. The lower end of the shaft 11 is attached to the uppermost edge of the blade 10, and diametrically below I attach a socketed-block 12 that engages a tapered step 13 which is attached centrally in the bottom of the receptacle. The upper end of the shaft extends beyond the top of the receptacle 8 and has miter-ear connection 14 with a driving-shaft 15. Of course other convenient forms of agitating the contents of the receptacle 8 and causing the desired reaction can be supplied and used, but I deem that shown and described as simple and economical a form as I have been able to discover and use for the purpose.

At the lower end of the receptacle 8 I provide an exit-pipe or outlet 16 under valve-control 17, the outer end of the pipe engaging and discharging into the branch 18 of a Y-joint 19 whose straight outer end receives and discharges into the inner

end of a coil of pipe 20. An air-conducting pipe 21 extends from the lower part of the air-tank 1 into the companion-branch 18^a of the Y-joint 19, and a central, longitudinal deflector partition or diaphragm 22 extends within the Y-joint 19, from the converging part 23 to a point coincident with the cylindrical part 19^a of the joint, as best shown in Fig. 2, and for the express purpose of concentrating the onward flow of the admixture of air and oil from the receptacle 8 without resistance or retardation and the independent, supplemental or auxiliary air-supply brought into action by the conductor 21, both of which together form an important feature in connection with my invention herein as they materially tend toward the final result of discharging the fluid in vesicle form of extraordinary volatility and combustibility.

The spiral, hollow coil 20 serves the special purpose of still further facilitating and augmenting the admixture of the air and oil for the vesicle form of final discharge, the circuitous or winding passage of the admixture being especially efficacious in mingling and churning into a homogeneous volume said air and oil that enter therein from the Y-joint 19 and thence depart through a pipe 24 that is surrounded by a jacket or enveloping and air-protecting nozzle 25, as best seen in Figs. 1 and 3. The exit-end 24^a of the pipe 24 is flattened, as best seen in Fig. 3, for the purpose of causing the fluid in extremely minute vesicle form to flow or discharge in a thin film or flat stream into the space beyond for the desired ignition and combustion, or such utilization as may be otherwise contemplated or desired. Air-conductor 5 leads from the lower part of the tank 1 to a double ended exit-branch 27 that enters the rear end of the enveloping-nozzle 25 for a supplemental supply or recharge of the initial air-pressure.

Transversely-arranged set-screws 28, 28 are provided in the flattened mouth 29 of the enveloping air-jacket or nozzle 25 for the purpose of controlling the discharge of the fluid or gases from said nozzle and the exit 24^a of the pipe 24. These set-screws are conveniently operated from the side, and the space between their inner ends is that which is regulated for the vesicle or gas discharge.

It will be readily seen that the flattening of the exit-end 29 of the air-nozzle 25 concentrates the envelop of air around the exit-end 24^a of the vesicle or gas discharge 24, whereby the said vesicle or gas discharge is completely protected from surrounding deleterious currents of air or the like, and the result is a perfect delivery of the fluid or gas to be utilized in its aerated form, and absolutely perfect combustion ensues that produces the very highest degrees of heat

desired at the least cost and with the simplest of apparatus or mechanism.

My invention as thus described, is particularly intended and adapted for use in connection with the preparation and supply of heavy oils, in connection with oil burning furnaces and the like. The churning by the paddles in the receptacle 8 starts the foaming of the oil, and the passage of the mixture through the fixed helix continues this process while the mixture is being carried forward to the furnace, the aim being to have the air so incorporated with the fuel that it is within the bubbles of the oil, through the oil between the bubbles, and also on the outside of the mixture, thus assuring a more complete combustion than with the method of injecting hydrocarbons into a furnace by means of an atomizer, where the oil is in the form of globules, the outside of which is burned and the center of which becomes carbonized.

I claim:—

1. In an apparatus of the character described, the combination of an oil receptacle having means therein for churning the oil to cause the same to foam, and having an outlet, a source of air under pressure connected to said receptacle, an air feed pipe leading from said source and connected to the outlet of said oil receptacle, means for mixing the air and churned fuel from the receptacle, a discharge nozzle in communication with the mixing means, and a second air feed pipe leading from said source of air under pressure and communicating directly with the said nozzle.

2. In an apparatus of the character described, the combination of an oil receptacle having means therein for churning the oil to cause the same to foam, and having an outlet, a pipe for feeding air under pressure extending into said receptacle and having its inner end opening adjacent the lower end thereof, and independent air feeding pipes in communication with the outlet from said receptacle at spaced points.

3. In an apparatus of the character described, the combination of an oil receptacle having means therein for churning the oil to cause the same to foam, and having an outlet, a pipe for feeding air under pressure extending into said receptacle and having its inner end opening adjacent the lower end thereof, independent air feeding pipes in communication with the outlet from said receptacle at spaced points, and mixing means between the spaced points of communication of the said air pipes.

4. In an apparatus of the character described, the combination of means for churning air and oil, independent pipes for supplying air under pressure, means for mixing the churned air and oil with the air from one of said supply pipes, and a discharging

element having means for delivering the mixture with the air from the other supply pipe.

5 In an apparatus of the character described, the combination of means for churning air and oil, independent pipes for supplying air under pressure, means for mixing the churned air and oil with the air from one of said supply pipes, and a dis-
10 charging element having means for deliver-

ing the mixture with the air from the other supply pipe, said discharging element also having means for controlling the outflow of the mixed fuel with respect to the outflow of air from the last mentioned supply pipe.

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Witnesses:

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