

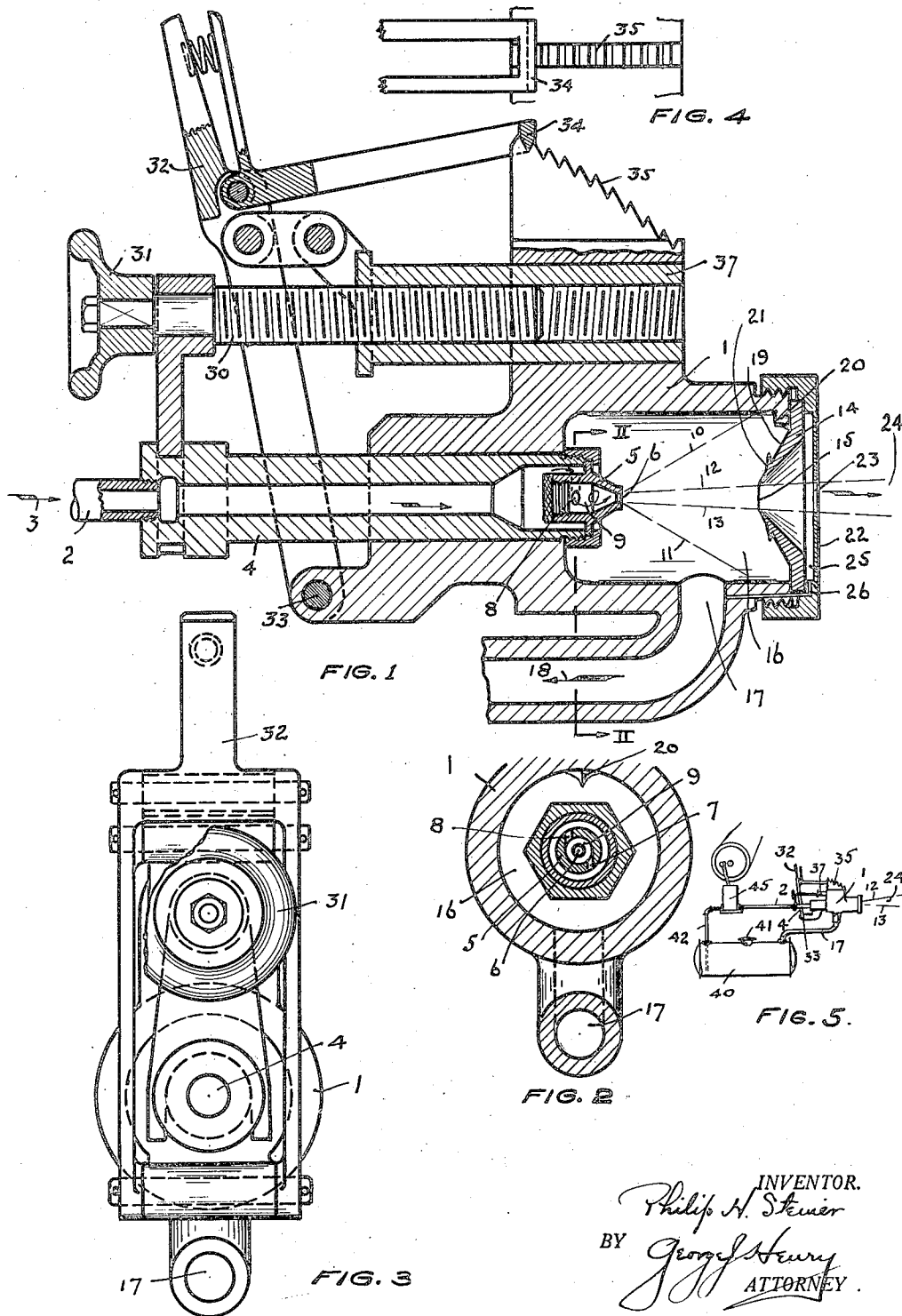
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FUEL BURNER

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FUEL BURNER.

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My invention has for its object the atomization, and the selection of the most finely divided portion of the atomized vapor for combustion, and the collection and the return of the coarser or heavier constituents of the vaporized fuel to be again passed through the atomizing means of the burner.

The burner of my invention is particularly adapted to the burning of hydrocarbon oils but may also be used with fluid or colloidal fuels.

Another object is a device of the character described wherein the atomizing nozzle is adjustable with respect to the selecting plate through which the vapor to be burned is allowed to pass.

Another object is a heat screen for the said selecting plate to screen the latter from high radiant heat occasioned by the burning vapor.

Another object is the employment of suitable drain means from between the selecting plate and the heat screen and from the atomizing chamber for returning the coarser constituents of the atomized fuel to the fuel sump or reservoir.

Other objects will appear from the drawings and specifications which follow:

These objects I accomplish by atomizing the oil or other fuel in a chamber while projecting the vapor with considerable velocity towards and portions of it through, an opening axially aligned therewith, and causing the said vapor to take on a rotary movement to facilitate the dividing of the vapor stream into relatively finer and coarser vapor or liquid particles by centrifugal force.

The said plate is spaced from the said nozzle and the rotary movement of the issuing vapor and the consequent action of centrifugal force on the vapor particles causes the heavier particles thereof to travel outward more rapidly than the lighter particles of the said vapor. There will therefore be retained in the central portion of the atomized stream the finer divided particles of fuel and these only are selected and passed through the opening of the aforesaid plate, all of the heavier particles being returned to the sump or fuel supply reservoir to be again passed through the atomizing nozzle.

Fig. 1 is a longitudinal cross section through one form of a burner employing my invention.

Fig. 2 is a cross section through a portion

of Fig. 1 and on the line II—II thereof.

Fig. 3 is a rear view of Fig. 1.

Fig. 4 is a plan of the ratchet for holding the adjusting means of the burner of Fig. 1.

Fig. 5 is a diagrammatic assembly of the burner of Fig. 1 with a reservoir and pump.

Throughout the figures similar numerals refer to identical parts.

The body portion of the burner is shown by the numeral 1 adapted to be supplied with fluid or colloidal fuel through the tube 2 in the direction of the arrow 3 from any conventional source, as the reservoir 40 and pump 45.

A fuel nipple is shown at 4, slidable in the body 1, and having at its outer end any form of atomizing nozzle adapted to give a whirling or rotary movement to the issuing atomized fuel.

In the form here selected the nozzle 5 provided with the atomizing outlet 6 receives fuel from the nipple 4 through the channel ways 7, 8 positioned off center to cause the fuel in the passage 9 to rotate and to continue to rotate as it issues through the atomizing outlet 6 forming the fuel vapor cone between the lines 10, 11.

Due to this rotation of the vapor cone the heavier particles will be thrown out adjacent the lines 10 and 11 and the finer particles or more perfectly atomized portions will be found between the limits indicated by the lines 12, 13, the vapor being finest on the axial center and having progressively coarser portions as the lines 10 and 11 are approached.

At 14 is a burner plate having a central opening 15 through which only the finer portions of the atomized fuel are admitted to pass, all other portions of the atomized fuel collecting within the chamber 16 and being returned through the passage 17 in the direction of the arrow 18 to the fuel sump or reservoir 40 or supply not shown but well known.

To prevent the heavier fuel which has once been separated from the path 12, 13 from returning down the sloping surface 19 of the plate 14 and becoming entrained by the selected spray passing through the opening 15, I introduce the baffle 20 which diverts the heavier portions to each side of the chamber 16 above the plate 14 and I also introduce a gutter edge 21 to prevent such oil as collects on the surface 19 from flowing down

and becoming entrained in the finer selected vapor.

At 22 is a disc having an opening 23 permitting the finer fuel stream which passes through the opening 15 to proceed through the plate and form the burning fuel stream 24. This disc 22 forms a heat screen for the plate 14. There is thus provided an air space 25 between the heat screen 22 and the plate 14 within which more or less condensation will from time to time occur and this is also drained back into the fuel sump 17 through the passageway 26.

Adjustment of the size of the issuing vapor jet 24 is effected by moving the nipple 4 and therefore the nozzle 5 with respect to the plate 14; and the means which I have shown for accomplishing this in the selected type of burner here set forth, consists of adjusting the screw 30 actuated by the hand wheel 31 whereby the nipple is withdrawn further from or advanced into the chamber 16; issuing fuel vapor 24 being in greater quantity as the nozzle 5 is moved towards the plate 14 and of lesser quantity as it is separated farther from the plate 14.

In Fig. 1 the parts are shown in their extreme position for the smaller vapor stream 24.

The pilot adjustment by the hand wheel 31 above described, after having once been made is not disturbed except under abnormal conditions, the more frequent adjustment being effected by the hand lever 32 fulcrumed at 33 and held in any adjusted position for the desired size of flame by the latch 34 and ratchet teeth 35.

The operation is as follows:

Fuel enters in the direction of the arrow 3 passing through the nipple 4 thence through the offset passages 7 and 8 into the nozzle passage 9, where it is now whirling with considerable velocity due to the offset of the openings 7 and 8. It now issues from the nozzle 6 as a fine spray which spray consists of relatively finer particles and relatively coarser particles.

Due to the rotation of the spray the heavier particles are thrown out and the finer particles are confined as between the lines 12, 13. The latter therefore pass freely through the openings 15, 23 forming the fuel jet 24 which burns with the highest degree of efficiency because of its fine division or atomization.

The heavier particles collect on the walls of the chamber 16 and are prevented by the dividing edge 20 and gutter 21 from becoming entrained in the stream 24 and are returned to the sump through the discharge port 17.

Such fuel as condenses within the space 25 is likewise returned through the ports 26 and 17, to the sump.

The plate 14 is shielded from the high ra-

diant heat of the burning jet 24 by the heat screen 22.

The nozzle is adjusted to give a larger or smaller jet 24 by shifting it either by the pilot adjustment of the hand wheel 31 and screw 30 or by the hand lever 32 actuating the slide 37 and carrying with it the screw 30.

The fuel supply through the tube 2 is under a pressure established by the pump 45 from any sump or reservoir as 40, the latter being connected with the pump through the pipe 42 and the discharge pipe 17 discharges into the said sump or reservoir. In this way a relatively larger amount of oil is pumped and supplied by the pump 45 and passes through the nozzle opening 6 forming the spray between the limits 10 and 11. A large portion of this is collected and returned and by my invention there is selected from the said spray the more finely atomized portion and therefore that portion which will burn with the greatest efficiency.

The adjustment of the nozzle 5 with respect to the plate 14 being withdrawn therefrom or advanced towards the said plate but retaining the openings 6, 15 and 23 in axial alignment at all times enables an adjustment of the size of the issuing jet 24 to be regulated with the utmost precision at any time during the operation of the burner.

Other forms of nozzle giving a rotary projected spray may be employed, as for example one in which the nozzle itself is rotated, without departing from the spirit of my invention.

I claim:

1. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained.

2. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained, a fuel supply reservoir into which said passage discharges.

3. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber,

a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained, a fuel supply reservoir into which said passage discharges and a pump interposed between said reservoir and said nozzle adapted to establish pressure to project the said spray.

4. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained, a heat screen beyond and spaced from said plate and having an aperture in said axial alignment to admit the projection of said center portion of said spray and a discharge duct from the space between the plate and the heat screen to return condensed spray therein to a reservoir, a fuel reservoir into which said passage and said duct are adapted to drain and means constructed and adapted to abstract fuel from said reservoir and project the same through said nozzle.

5. Apparatus as set forth in claim 1 wherein said plate is of conical shape and is provided with means preventing the fuel collected within the chamber from entrainment with the said center portion of said spray.

6. Apparatus as set forth in claim 2 wherein said plate is of conical shape and is provided with means preventing the fuel collected within the chamber from entrainment with the said center portion of said spray.

7. Apparatus as set forth in claim 3 wherein said plate is of conical shape and is provided with means preventing the fuel collected within the chamber from entrainment with the said center portion of said spray.

8. Apparatus as set forth in claim 4 wherein said plate is of conical shape and is provided with means preventing the fuel collected within the chamber from entrainment with the said center portion of said spray.

9. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said

collected fuel spray is drained and means for varying the distance between the plate and the nozzle to vary the volume of said center portion of said spray passing through said aperture.

10. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained, a fuel supply reservoir into which said passage discharges, and means for varying the distance between the plate and the nozzle to vary the volume of said center portion of said spray passing through said aperture.

11. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained, a fuel supply reservoir into which said passage discharges and a pump interposed between said reservoir and said nozzle adapted to establish pressure to project the said spray, and means for varying the distance between the plate and the nozzle to vary the volume of said center portion of said spray passing through said aperture.

12. A burner comprising a body having a chamber therein, an atomizing nozzle adapted to project fuel with a rotary motion and as a conical shaped spray into said chamber, a plate having an aperture substantially axially aligned with said nozzle whereby the center portion of said spray is passed through said aperture and the remainder of said fuel spray is collected in said chamber, a passage from said chamber by which said collected fuel spray is drained, a heat screen beyond and spaced from said plate and having an aperture in said axial alignment to admit the projection of said center portion of said spray and a discharge duct from the space between the plate and the heat screen to return condensed spray therein to a reservoir, a fuel reservoir into which said passage and said duct are adapted to drain and means constructed and adapted to abstract fuel from said reservoir and project the same through said nozzle, and means for varying the distance between the plate and the nozzle to vary the volume of said

center portion of said spray passing through said aperture.

13. Apparatus as set forth in claim 9 wherein said plate is of conical shape and is provided with means preventing any of the fuel collected within the chamber from entrainment with the center portion of said spray.

14. Apparatus as set forth in claim 10 wherein said plate is of conical shape and is provided with means preventing any of the fuel collected within the chamber from entrainment with the center portion of said spray.

15. Apparatus as set forth in claim 11 wherein said plate is of conical shape and is provided with means preventing any of the fuel collected within the chamber from entrainment with the center portion of said spray.

16. Apparatus as set forth in claim 12 wherein said plate is of conical shape and is provided with means preventing any of the fuel collected within the chamber from entrainment with the center portion of said spray.

17. The method of producing a selected fuel spray from a burner which consists of causing the fuel to be atomized as a conical spray and then selecting from said conical spray the center portion to be burned and collecting the other portion of said spray

and against passing said collected portion through said nozzle.

18. The method of producing a selected fuel spray from a burner which consists of causing the fuel to be atomized as a conical spray and then selecting from said conical spray the center portion to be burned and collecting the other portion of said spray and again passing said collected portion through said nozzle with additional fuel.

19. The method of producing a selected fuel spray from a burner which consists of causing the fuel to be atomized as a conical spray and then selecting from said conical spray the center portion to be burned and collecting the other portion of said spray and again passing said collected portion through said nozzle and varying the relative quantity of said central portion to suit the load requirements of said burner.

20. The method of producing a selected fuel spray from a burner which consists of causing the fuel to be atomized as a conical spray and then selecting from said conical spray the center portion to be burned and collecting the other portion of said spray and again passing said collected portion through said nozzle with additional fuel and varying the relative quantity of said central portion to suit the load requirements of said burner.

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