March 24, 1953 D. L. GETZ ET AL 2,632,499

FLOW STABILIZING DEVICE FOR GUN-TYPE OIL BURNERS

Filed Jan. 16, 1948 3 Sheets-Sheet 1

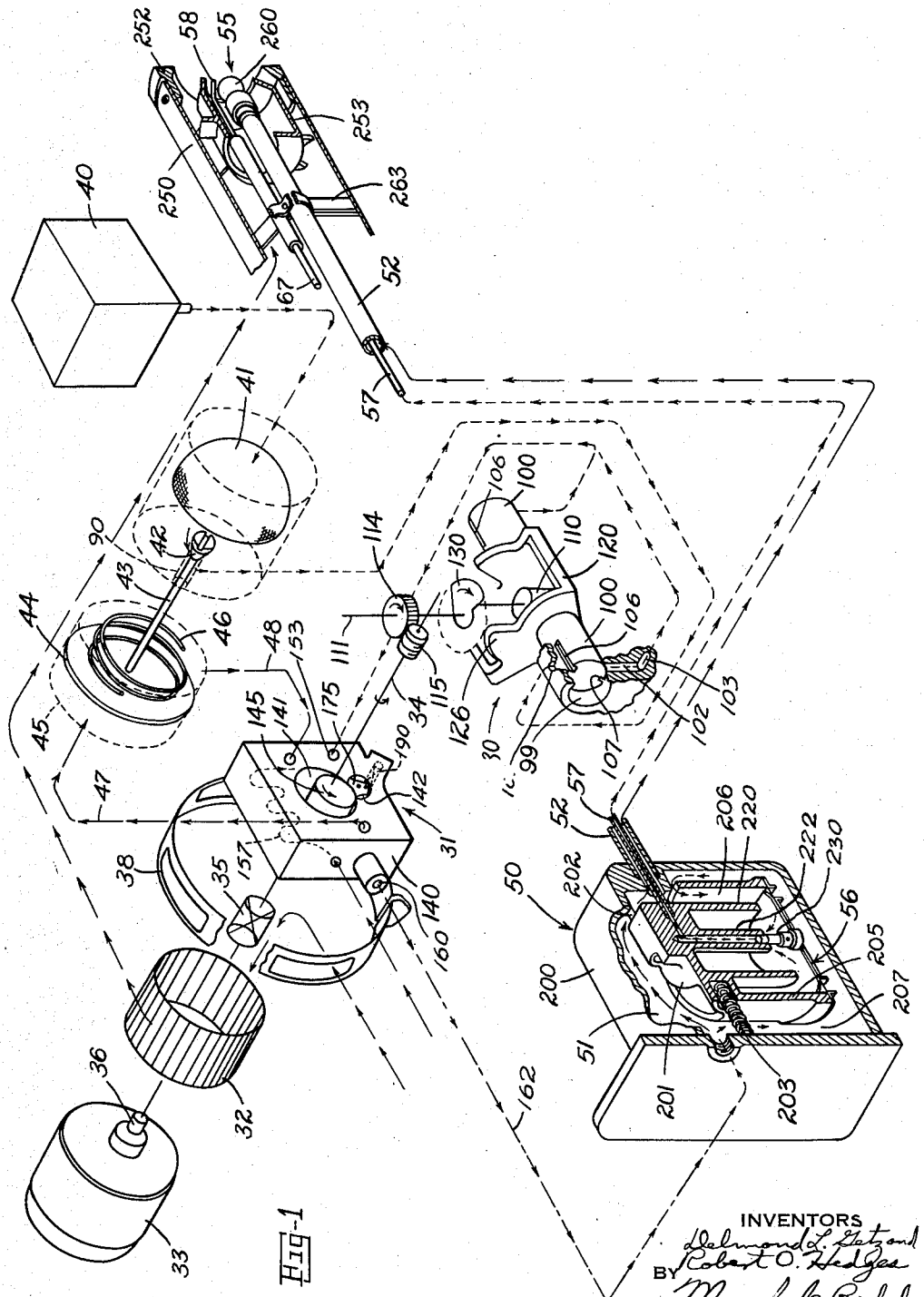


Fig-1

INVENTORS
Delmond L. Getz and
Robert O. Hedges
BY
Marshall & Biebel
ATTORNEYS

March 24, 1953 D. L. GETZ ET AL 2,632,499

FLOW STABILIZING DEVICE FOR GUN-TYPE OIL BURNERS

Filed Jan. 16, 1948 3 Sheets-Sheet 2

Fig-2

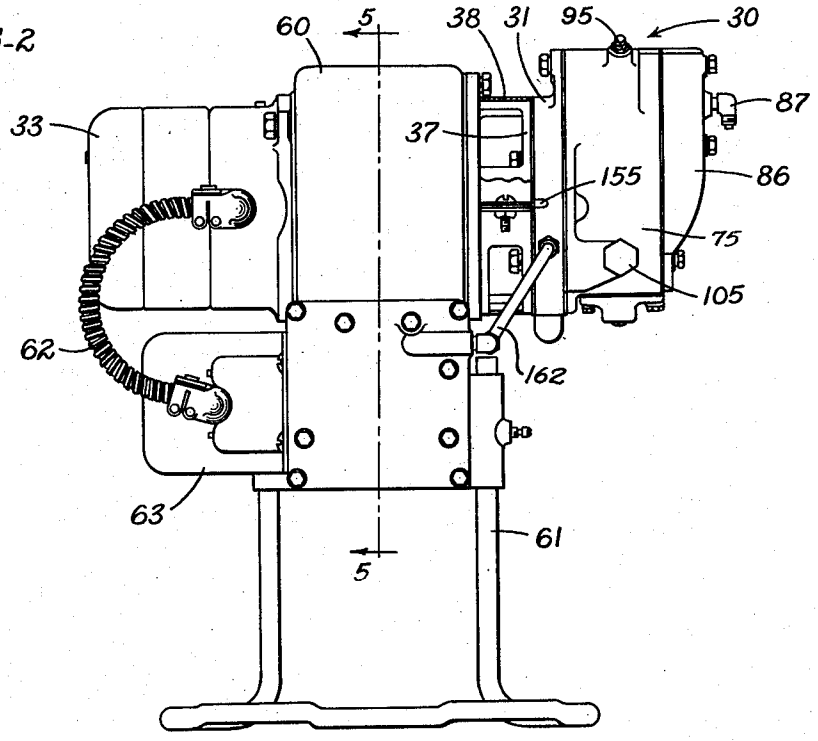
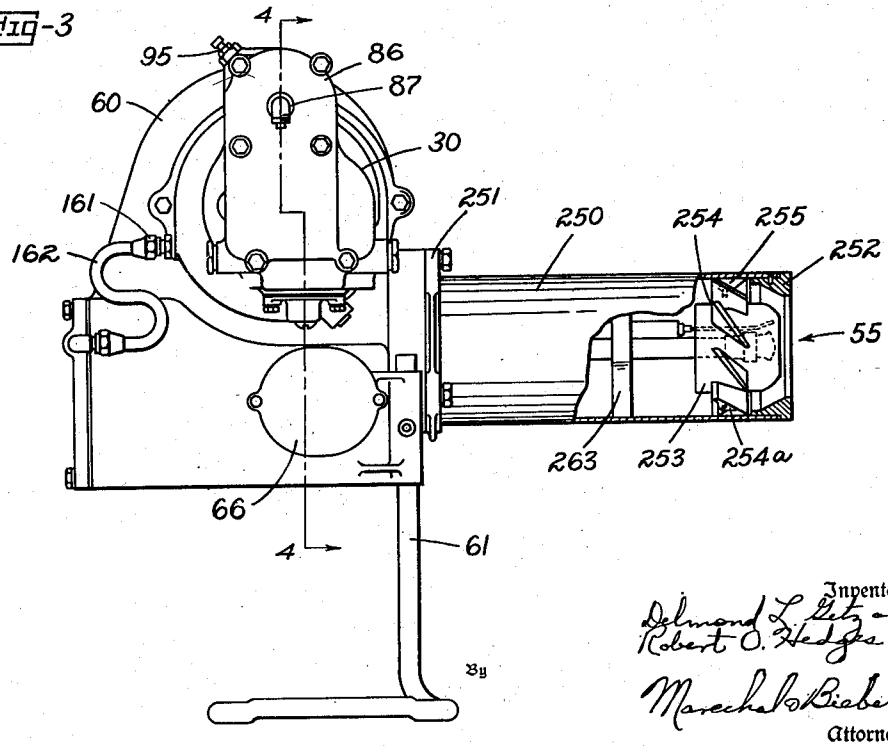


Fig-3



Inventor
Delmond L. Getz and
Robert O. Hedges
By
Marechal & Biebel
Attorneys

March 24, 1953 D. L. GETZ ET AL 2,632,499

FLOW STABILIZING DEVICE FOR GUN-TYPE OIL BURNERS

Filed Jan. 16, 1948 3 Sheets-Sheet 3

Fig-4

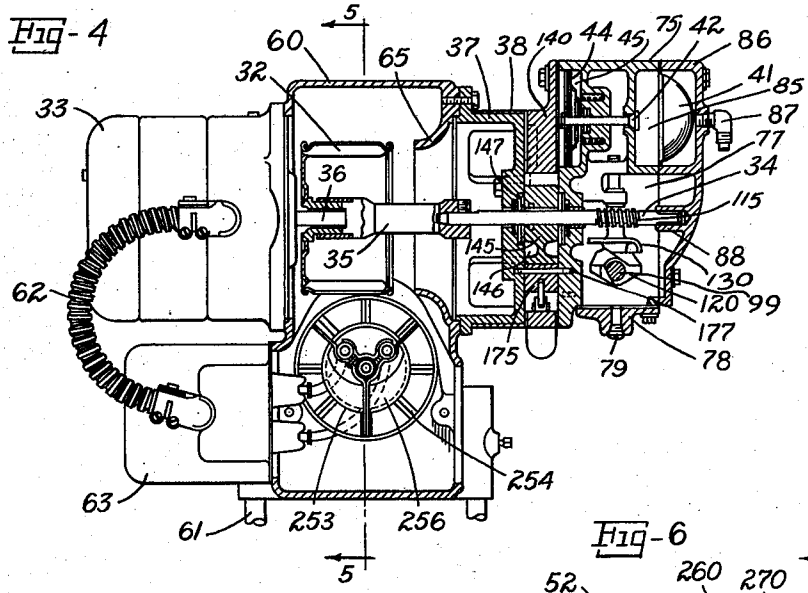


Fig-6

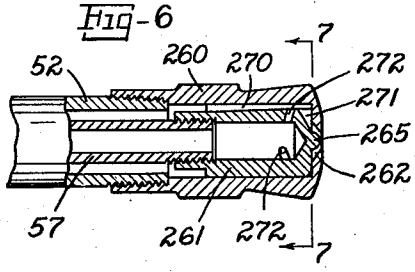


Fig-5

Fig-8

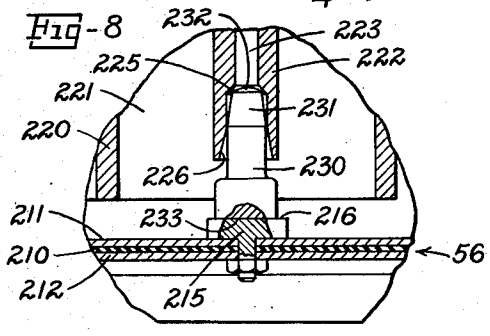
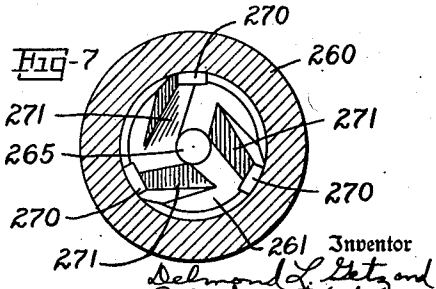


Fig-7



Inventor
Delmond L. Getz and
Robert O. Hedges
By
Marechal & Biebel
Attorneys

Patented Mar. 24, 1953 2,632,499

UNITED STATES PATENT OFFICE

2,632,499

FLOW STABILIZING DEVICE FOR GUN-TYPE OIL BURNERS

Delmond L. Getz and Robert O. Hedges, Springfield, Ohio, assignors to The Steel Products Engineering Company, Springfield, Ohio, a corporation of Ohio

Application January 16, 1948, Serial No. 2,713

4 Claims. (Cl. 158—36)

1

This invention relates to oil burners for heating purposes and the like.

One of the principal objects of the invention is to provide an oil burner for heating purposes which is of improved, simple and reliable construction, which does not require frequent servicing or adjustment, and which will assure steady, uniform, quiet and efficient combustion.

Another object is to provide an oil burner in which the liquid fuel is supplied at a metered rate to an atomizing pump and mixed with air for delivery to a flow stabilizing device in which the fuel is separated from the air and then delivered to the nozzle in a steady and constant flow under balanced pressure conditions unaffected by pulsations in the supply pressure for remixing with the air and combustion.

An additional object is to provide an oil burner having a flow stabilizing device which is adapted to separate the atomized mixture of liquid fuel and air for separate delivery to the nozzle and which includes a chamber for entrapping air to serve as a cushion for damping out pulsations in the fuel supply pressure and facilitating delivery of a steady and constant flow of liquid fuel to the nozzle.

It is also an object of the invention to provide a flow stabilizing device for an oil burner which includes a differential diaphragm responsive to the weight of the liquid fuel effective thereon to regulate the rate of supply of fuel to the nozzle and which also includes a valve controlled by the diaphragm and constructed for self-aligning operation therewith and with its valve orifice to minimize friction and resulting erratic operation.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings, in which like characters of reference designate like parts throughout—

Fig. 1 is a diagrammatic view of an oil burner system in accordance with the invention showing schematically the operative relation of the parts and the paths of flow of fuel therethrough;

Fig. 2 is a view in rear elevation of the oil burner;

Fig. 3 is a view showing the oil burner in side elevation with a portion of the combustion head broken away to illustrate details of internal construction and arrangement;

Fig. 4 is a view partly in rear elevation and partly in vertical section on the line 4—4 of Fig. 3 and also of Fig. 5;

Fig. 5 is a view in vertical section on the line 5—5 of Fig. 2 and also of Fig. 4;

2

Fig. 6 is an enlarged detail view of the nozzle, the view being in section substantially on the line 6—6 of Fig. 7;

Fig. 7 is a detail view of the nozzle on a still larger scale taken in section substantially on the line 7—7 of Fig. 6; and

Fig. 8 is an enlarged fragmentary view of the metering valve and differential diaphragm of the flow stabilizer.

Referring to the drawings, which illustrate a preferred embodiment of the invention, Fig. 1 illustrates schematically the operative relation of the main component parts of the oil burner and the paths of flow of fuel therethrough—the oil being represented by short dash lines, the air by long dash lines, and the mixed oil and air by alternating short and long dash lines. An oil metering pump 30, an atomizing air pump 31 and a fan or blower 32 for supplying secondary air are all driven by an electric motor 33 through shaft 34 having a flexible connection 35 to the drive shaft 36 of the motor. A damper 37 including an adjustable slotted sleeve member 38 controls the supply of air to the blower 32.

The oil from a supply tank 40 is initially admitted to the metering pump 30 through a strainer 41 and a tapered shutoff valve 42 carried by the rod 43 of a piston 44 in a pressure chamber 45 in the top of the metering pump. A spring 46 normally biases piston 44 to a position closing valve 42. A pressure connection 47 is provided from the atomizing air pump 31 to the pressure side of piston 44 so that when the burner is started, the pressure from pump 31 acts to move the piston against spring 46 to a position opening valve 42 to admit oil to the metering pump. The low pressure side of piston 44 is vented to the suction side of the pump 31 as indicated at 48.

The metering pump 30 supplies oil at a metered rate to the atomizing pump 31, which mixes this oil with air and supplies the resulting atomized mixture to a flow stabilizing device indicated generally at 50 and described in detail hereinafter in connection with Figs. 5 and 8. The flow stabilizer 50 includes a chamber 51 in which the atomized mixture is allowed to separate into air and liquid oil. The air is transmitted through a tube 52 to the nozzle in the combustion head 55 to serve as primary air. A differential diaphragm indicated generally at 56 controls the supply of oil from the flow stabilizer 50 to the nozzle, the oil being transmitted to the nozzle through a tube 57 mounted within the air tube 52. At the nozzle, the liquid oil and primary air are mixed and ignited by a spark induced between the electrodes 58, and the secondary air is supplied thereto from

the blower 32 as described in detail hereinafter in connection with Figs. 5 to 7.

The general construction of the burner is illustrated in more detail in Figs. 2 to 5. As shown, it includes a main supporting frame or casting forming a casing 60 having an adjustable base 61. The motor 33 is mounted at one side of the casing 60 and is connected through the cable 62 with a high voltage transformer 63 which is also mounted on the side of casing 60. The casing 60 forms a housing for the fan or blower 32 and is provided on its side opposite the motor with an inwardly extending flange 65 forming an air intake passage for the blower from the damper 37, which is bolted to casing 60 adjacent this flange 65 as shown in Fig. 4. The atomizing air pump 31 is supported on the main frame by being bolted to the damper 37, and the oil metering pump 30 is in turn bolted to the pump 31. A removable cap 66 on the side of casing 60 provides ready access to the terminals of transformer 63 for connecting the lead cables 67 to the electrodes 58 at the nozzle.

The construction and operation of the oil metering pump 30 are shown in detail in our copending application Serial No. 188,450, filed October 4, 1950, as a continuation-in-part of the present application. As shown, the pump includes a casing 75 defining a main chamber 77 which initially receives the oil from tank 40 admitted by valve 42, the lower end of this chamber being closed by a cover plate 78 provided with a drain plug 79. The upper part of casing 75 is formed to define the pressure chamber 45 for piston 44, and the pump casing is also formed with an intake chamber 85 for receiving oil transmitted by strainer 41, which is mounted adjacent chamber 85 in a cover 86 bolted to the outer side of casing 75. Cover 86 is provided with a fitting 87 for connection to the oil line from the supply tank, and it is also formed with a boss 88 for receiving the outer end of drive shaft 34 as shown in Fig. 4. The oil entering chamber 85 is transmitted to chamber 77 through the passage 90 controlled by the tapered valve 42 as already described in connection with Fig. 1. An adjustable air vent 95 for chamber 77 is provided in the top of casing 75 as shown in Figs. 2 and 3.

The pump casing 75 is formed in its lower part to define a pair of coaxial cylinders 99 each having a piston 100 mounted for reciprocating and oscillating movement therein. Each cylinder is provided with an intake port 101 from chamber 77 and an outlet port 102 spaced angularly from port 101 and leading to a passage 103 in casing 75 having a discharge port leading to the atomizing air pump 31. A plug 105 serves as a removable closure for the outer end of each cylinder 99. Each piston 100 has a pair of grooves 106 and 107 in its outer surface adapted to register with ports 101 and 102, respectively, these grooves being spaced angularly by an amount less than the angular spacing of ports 101 and 102 so that only one groove and port can be in registry at one time.

The reciprocating movement of the pistons in cylinders 99 is produced by an eccentric crank pin 110 at the lower end of a crank 111 mounted within chamber 77 and driven through a worm gear 114 formed integrally therewith and meshing with a worm portion 115 of shaft 34. Crank pin 110 engages the inner ends of pistons 100, and a rocker 120 cooperates with shaft 111 to provide for oscillating movement of the pistons at each end of the strokes thereof sufficient to cause the grooves 106 to register with ports 101 during the suction strokes of the pistons and to cause grooves 107 to register with ports 102 during the pressure strokes of the pistons.

This oscillating movement of the rocker 120 and pistons 100 is effected in timed relation with the reciprocating movement of the pistons by means of upwardly projecting cam lobes 126 arranged at diagonally opposite positions on the sides of rocker 120 in cooperation with an integral cam portion 130 of crank 111. This cam 130 is arranged in such angular relation with the crank pin 110 and the axis of crank 111 that its leading edge will contact and begin to depress one cam lobe 126 just as its trailing edge clears the other cam lobe 126, this point in the revolution of crank 111 representing the end of the suction stroke for one piston and the end of the pressure stroke for the other piston. In addition, the total angular extent of cam 130 is such in relation to the cam lobes 126 that rocker 120 is held in substantially fixed position during the full stroke of each piston and is then rocked with the pistons as the crank pin 110 passes over dead center in preparation for the next strokes of the pistons.

The construction and operation of the atomizing air pump 31 are shown in detail in our copending application Serial No. 188,451, filed October 4, 1950, as a continuation-in-part of the present application. The pump housing 140 is formed with a pair of overlapping cylindrical chambers 141 and 142 extending completely therethrough, the chamber 141 being of larger diameter than chamber 142. A cylindrical rotor 145 of smaller diameter than chamber 141 is mounted therein for rotation with shaft 34 eccentrically of chamber 141. The rotor 145 is partially hollowed at 146 for purposes of balance, and it is provided with a suitable oil seal 147 adjacent gasket 144 as shown in Fig. 4.

The oil from the metering pump 30 enters the chamber 141 through a port indicated diagrammatically at 153 (Fig. 1) which opens into chamber 141 adjacent chamber 142. The air for mixing with the oil in chamber 144 enters the pump initially through a port 155 (Fig. 2) in the outer surface of housing 140 and flows to chamber 141 through a sinuous groove forming an air muffler and indicated diagrammatically at 157 in Fig. 1. A discharge or outlet passage 160 is provided in pump housing 140 on the opposite side of inlet 153, the outlet passage 160 opening into chamber 142 and communicating therethrough to chamber 141. A fitting 161 is mounted at the outer end of outlet 160 to provide a connection to a pipe or hose 162 (Figs. 2 and 3) leading to the flow stabilizer 50 as described in connection with Fig. 1.

A valve 175 is mounted for rocking movement in chamber 142 to control communication between inlet 153 and outlet 160 as the rotor 145 revolves. This valve 175 is mounted on a pin or dowel 177 positioned concentric with chamber 142 and set in pump housing 75 and air damper 37 as shown in Fig. 4. A spring 190 provides a constant biasing force urging the valve 175 into continuous contact with the rotor 145 as the latter revolves in chamber 141.

It will accordingly be seen that the valve 175 is at all times effective to prevent communication between the inlet passage 153 and the outlet passage 160 through the chamber 142 or the lower part of the chamber 141. The only communication from inlet 153 to outlet 160 is thus through chamber 141 in the direction of rotation

of the rotor 145. During the major part of each revolution, the rotor acts to separate chamber 141 into two portions which constantly vary in size and constitute a suction portion connected with the inlet passage 153 and a pressure portion connected with the outlet 160. The relative sizes of the two chambers and rotor 145 are such as to provide a total capacity for the chambers which is in excess of the effective capacity of the cylinders 99 in the oil pump 30, and since it does not fill this space, a quantity of air is also taken in sufficient to make up the deficiency. The resulting mixture of oil and air is then forced out through the discharge passage 160.

The atomized mixture of oil and air from pump 31 is transmitted through the pipe or hose 162 to the flow stabilizing device 50, which includes a housing 200 (Fig. 5) bolted within casing 60 and defining therewith the chamber 51. A casting 201 is mounted in chamber 51 for sliding movement on two pins 202 set in the wall of housing 200, and a spring 203 is positioned to exert tension between casting 201 and the adjacent wall of casing 60 to urge casting 201 in the direction of the combustion head. The tube 52 is fixed in the end wall of housing 200 in open communication with the chamber 51, and the tube 57 extends through tube 52 and is secured to casting 201 for movement therewith with respect to tube 52 and housing 200.

The casting 201 includes an annular wall 205 which divides chamber 51 into inner and outer compartments 206 and 207, respectively, having open communication at the top of the upper edge of wall 205. The dimensions of wall 205 are such as to give the inner compartment 206 a substantially greater area in horizontal section than outer compartment 207. The lower end of wall 205 terminates above the bottom wall of housing 200 and is closed by the differential diaphragm unit 56, which includes a flexible member 210 (Fig. 8) of rubber or like suitable material provided with reinforcing plates 211 and 212 and a supporting ring 213 bolted to the bottom edge of wall 205. A button 215 having a ground upper surface 216 is secured in the center of the diaphragm unit as shown in Fig. 8.

A bell-shaped portion 220 of casting 201 forms a third compartment 221 within compartment 206 which is closed at its upper end but communicates at its lower end with the compartment 206. A hollow boss or stem portion 222 of casting 201 extends downwardly within compartment 221 to provide a connection through its internal passage 223 with a passage 224 in the upper part of the casting 201 leading into the tube 57. The lower end of passage 223 includes a countersunk valve seat 225 and a diverging outer mouth portion 226 as best shown in Fig. 8. This passage is controlled by a valve pin 230 having a tapered upper portion 231 terminating in a rounded upper end 232 adapted to engage valve seat 225. The lower end of valve pin 230 has a ground surface 233 supported on the complementary ground surface 216 of button 215.

In the operation of this part of the burner, the atomized mixture entering the flow stabilizer from pump 31 separates in chamber 51, the liquid oil dropping initially into compartment 207 and the air filling the remaining space and then passing to the nozzle by way of tube 52. As the oil fills compartment 207, its weight exerts pressure on the bottom of the diaphragm unit 56, forcing valve pin 230 upwardly to a seated position of its upper end 232 with respect to valve seat 225 and thus closing the oil passage to the nozzle. When compartment 207 is completely full, the liquid oil overflows wall 205 and begins to fill the inner compartment 206, and at the same time it entraps air in the compartment 221.

As the level of liquid rises in compartment 206, it exerts a force against the top of diaphragm unit 56 counteracting the force of the liquid in the outer compartment 207. Since the effective area of compartment 206 is greater than that of compartment 207, the diaphragm will begin to move downwardly as soon as the liquid in the compartment 206 rises to a point where its weight balances the weight of the liquid above the level of the diaphragm in the outer compartment 207. This movement of the diaphragm allows valve pin 230 to move similarly downward away from valve seat 225, thus permitting the liquid oil to begin to flow upward through passage 223 to the nozzle. The more the level rises within compartment 206, the more the diaphragm will move to increase the opening past the tapered valve portion 231 and allow more liquid fuel to pass to the nozzle until a balanced position is reached at which the amount of liquid fuel entering the chamber 51 and the amount leaving by way of passage 223 will be equal.

After a balanced position of the valve and diaphragm is reached, the rate at which the liquid oil flows through the chamber will remain at a constant rate equal to the output of the oil metering pump 30. If there is a change in the output of the metering pump, the resulting change in the level of liquid in compartment 206 will produce a corresponding movement of the diaphragm unit until a balance is again reached. It should also be noted that the air entrapped in the compartment 221 acts as a cushion to absorb pulsations in the fuel supply line from the pump 31, this cushioning action being augmented by the air at the top of chamber 51 and also by the free action of the diaphragm, thus assuring a steady and constant flow of fuel to the nozzle.

The construction of the combustion head is best shown in Figs. 3 to 7. An outer air tube 250 is bolted to the front part of casing 60 by means of a supporting ring 251 and opens directly into the interior of casing 60, and an outer air cone 252 is bolted in the outer end of tube 250. An inner air cone 253 is mounted within the outer end of tube 250 and includes inclined air swirl plates or fins 254, which are integrally formed with or otherwise secured to cone 253 and extend outwardly into the annular passage 255 between cone 253 and the inner surface of tube 250. Cone 253 may be readily secured in position by forming two of the plates 254 to receive a mounting screw for attachment to tube 250, as indicated at 254a in Fig. 3. The rear end of cone 253 is formed in its lower part with an integral baffle portion 256 partially closing the entrance to the passage 257 within the cone 253 and thus limiting the amount of secondary air released closely adjacent the outlet of the nozzle, this arrangement having been found to give combustion of increased efficiency in operation. In this connection, reference is made to our co-pending application Serial No. 188,448, filed October 10, 1950, as a continuation-in-part of the present application.

The construction of the nozzle is shown in detail in Figs. 6 and 7. It includes an outer or jet portion 260 and an inner or swirl portion 261. The jet 260 has a tapered discharge orifice 262 at its outer end and is mounted on the front end of tube 52, which is in turn supported substan-

tially centrally of tube 250 by a bracket 263 which also supports the electrode cables 67 and electrodes 58. The nozzle is thus held in substantially centered relation with the inner air cone 253 as shown in Fig. 5.

The swirl portion 261 of the nozzle is mounted on the front end of tube 57 and has sliding clearance within jet 260 but is normally held with its front end in contact with the front end of the jet by the action of the spring 203 in the flow stabilizer 50. Swirl 261 has a hemispherical button 265 at its front end which is thus normally held within the larger end of the jet orifice 262 to assure proper jet action. A plurality of axially extending grooves 270 are formed along the outer surface of swirl 261, and similar grooves or slots 271 are cut in the front end of the swirl, each slot 271 connecting with a groove 270 but being angularly arranged as shown in Fig. 7 to give a spiral or swirl effect to fuel passing therethrough. Each groove 270 is also connected with the interior of swirl 261 by a radially arranged passage 272.

It will thus be seen that liquid fuel from the chamber 206 in the flow stabilizer travels through tube 57 to the swirl 261 and out through the passages 272 into grooves 270. In the meantime, the air from chamber 51 travels through tube 52 under pressure and through the grooves 270, where it picks up the liquid oil and is discharged through orifice 262 with a swirling effect imparted by the angular arrangement of slots 271 for combustion with the secondary air supplied through passages 255 and 257 from the blower 32. At the start of each burner operation, a spark is induced between electrodes 58, and the secondary air passing through passage 257 blows the spark into the atomized mixture of air and liquid oil discharged from orifice 262 to effect ignition of the fuel. Thereafter the burner will continue to operate so long as fuel is supplied to the nozzle.

In the operation of this oil burner system as a whole, the liquid oil from tank 40 passes through strainer 41 in sufficient volume to fill the chamber 85 in oil pump housing 75, but valve 42 prevents the oil from entering chamber 77 as long as the motor 33 is idle. As soon as the motor is started, it sets the two pumps in operation, and the pressure air from the atomizing pump 31 is supplied as described to the pressure chamber 45 in the oil pump to move piston 44 to a position opening the shutoff valve 42, thus allowing oil to flow into and fill the chamber 77. This oil is then drawn into the cylinders 99 and then pumped to the atomizing air pump for mixture with air and delivery to the flow stabilizer 50, the oil thus providing continuous lubrication for the air pump 31.

The atomized mixture of oil and air entering the flow stabilizer separates in chamber 51, with the oil collecting first in compartment 207 and then overflowing into compartment 206 as already described until it reaches a height in the inner compartment 206 sufficient to cause the differential diaphragm to begin opening valve pin 230. When this occurs, the continued weight of the fuel and the pressure of the air in the upper part of chamber 51, which amounts in operation to approximately 3 pounds gage pressure, forces the oil up through passage 223 and through the tube 57 to the nozzle, the action of the flow stabilizer in separating the fuel mixture having the combined effect of providing an even flow of oil to the nozzle by the action of the valve 230 as described and also eliminating pulsations from the atomizing air pump 31 by means of the dampening chamber 221. At the nozzle, it is mixed with the primary air flowing through tube 52 from chamber 51 and is discharged through the orifice 262 as a swirling atomized spray. This spray is ignited by means of the electrodes 58, as described, for combustion with the secondary air supplied by the blower 32 through the tube 250 and the annular passages 255 and 257.

The burner will continue to operate at a constant rate so long as the oil output of the metering pump 30 remains constant, a steady and even flow of fuel to the nozzle being provided by the action of the flow stabilizer as already described. If this output changes, the change will be compensated for by the action of the differential diaphragm to stabilize the operation of the burner at the new output level. When the burner is shut off, by stopping motor 33, the valve 42 closes to shut off the further supply of oil to the metering pump, and any liquid oil remaining in the nozzle and tube 57 will tend to drain back into the flow stabilizer in preparation for the next burning cycle. Also, any oil which may have entered the pressure chamber 45 will similarly drain back into the atomizing pump. When the motor is restarted, substantially the same cycle of operation will take place except that since the flow stabilizer is already filled with liquid oil, there will be no time delay for filling the compartments 206 and 207, and ignition will take place almost immediately.

While the forms of apparatus herein described constitute preferred embodiments of the invention, it is to be understood that the invention is not limited to these precise forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A flow stabilizing device for use in an oil burner of the character described to receive a mixture of oil and air for separation and separate delivery of the air and liquid oil to the burner nozzle, comprising a casing forming a closed chamber, said chamber having an inlet adjacent the top thereof to receive said mixture for separation into air and liquid oil, means for conducting said air from the upper part of said chamber to said nozzle, means forming inner and outer compartments in said chamber having open communication at the top thereof, a flexible diaphragm forming the bottom of said inner compartment and spaced above the bottom of said outer compartment, said inner compartment having greater area in horizontal section than said outer compartment, means forming a passage opening into said inner compartment for conducting oil therefrom to said nozzle, a valve for controlling said opening, and means operatively connecting said valve and said diaphragm to provide for regulating the position of said valve with respect to said passage opening in accordance with the difference in the pressures effective on said diaphragm in said inner and outer compartments.

2. A flow stabilizing device for use in an oil burner of the character described to receive a mixture of oil and air for separation and separate delivery of the air and liquid oil to the burner nozzle, comprising a casing forming a closed chamber, said chamber having an inlet adjacent the top thereof to receive said mix-

ture for separation into air and liquid oil, means for conducting said air from the upper part of said chamber to said nozzle, means forming inner and outer compartments in said chamber having open communication at the top thereof, a flexible diaphragm forming the bottom of said inner compartment and spaced above the bottom of said outer compartment, said inner compartment having greater area in horizontal section than said outer compartment, means forming a passage opening into said inner compartment for conducting oil therefrom to said nozzle, a valve pin for controlling said passage opening, and a button carried by said diaphragm and engaging the lower end of said valve pin to regulate the position of said pin with respect to said opening in accordance with the difference in pressures effective on said diaphragm in said inner and outer compartment, said valve pin and said button having cooperating ground surfaces providing for self alignment and minimum friction between said valve pin and said passage opening.

3. A flow stabilizing device for use in an oil burner of the character described to receive a mixture of oil and air for separation and separate delivery of the air and liquid oil to the burner nozzle, comprising a casing forming a closed chamber, said chamber having an inlet adjacent the top thereof to receive said mixture for separation into air and liquid oil, means for conducting said air from the upper part of said chamber to said nozzle, means forming inner and outer compartments in said chamber having open communication at the top thereof, a flexible diaphragm forming the bottom of said inner compartment and spaced above the bottom of said outer compartment, said inner compartment having greater area in horizontal section than said outer compartment, means forming a third compartment within said inner compartment and closed at the upper end thereof, said third compartment communicating with said inner compartment at the lower end thereof to receive and entrap air when said inner compartment is filled with oil above the level of the bottom of said third compartment, means within said third compartment forming a passage adapted to receive oil from said inner compartment for delivery to said nozzle, a valve for controlling said opening, and means operatively connecting said valve and said diaphragm to provide for regulating the position of said valve with respect to said opening in accordance with the difference in the pressures effective on said diaphragm in said inner and outer compartments, said entrapped air within said third compartment providing a cushion damping out variations in pressure in the fuel supply line to said chamber and promoting a steady and constant flow of liquid fuel to said nozzle.

4. A flow stabilizing device for use in an oil burner of the character described to receive a mixture of oil and air for separation and separate delivery of the air and liquid oil to the burner nozzle, comprising a casing forming a closed chamber, said chamber having an inlet in the upper part thereof to receive said mixture for separation into air and liquid oil, means for conducting said air from the upper part of said chamber to said nozzle, means forming inner and outer compartments in said chamber having open communication at the top thereof, a flexible diaphragm forming the bottom of said inner compartment and spaced above the bottom of said outer compartment, one of said compartments being positioned to receive said oil directly from said inlet to provide for initially filling said inlet with oil and subsequent spilling of said oil into the other said compartment, said other compartment being of greater area in horizontal section than said one compartment, means forming a passage opening into said chamber for conducting oil therefrom to said nozzle, and a valve supported by said diaphragm for controlling said opening to provide for regulating the position of said valve with respect to said opening in accordance with the difference in the pressures effective upon said diaphragm in said compartments.

DELMOND L. GETZ.
ROBERT O. HEDGES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,719,501	Denison	July 2, 1929
1,724,658	Jennings	Aug. 13, 1929
1,799,902	Hoff	Apr. 7, 1931
1,817,051	Williams	Aug. 4, 1931
1,986,003	Lum	Jan. 1, 1935
2,032,291	Lum	Feb. 25, 1936
2,090,150	Pontius, Jr.	Aug. 17, 1937
2,222,031	Hammer	Nov. 19, 1940
2,254,123	Soaper	Aug. 26, 1941
2,325,893	Vollmer	Aug. 3, 1943
2,397,987	Senninger	Apr. 9, 1946