May 2, 1961 W. E. BAKER 2,982,215

ATOMIZING PUMP

Filed Sept. 2, 1958 2 Sheets-Sheet 1

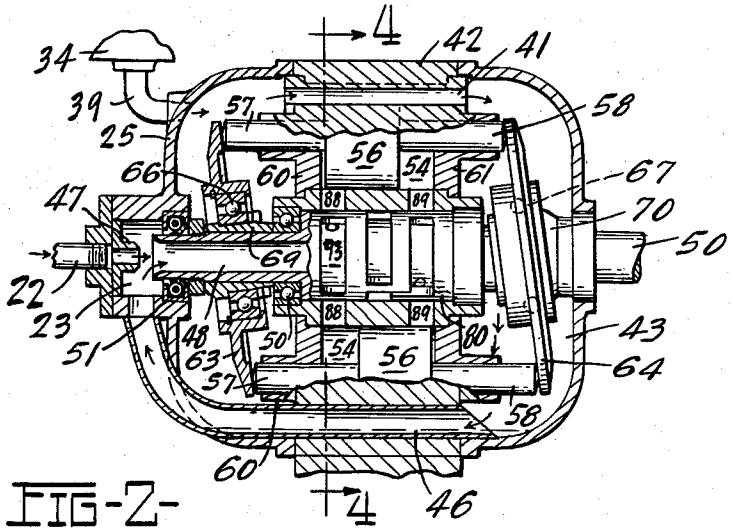


FIG-2-

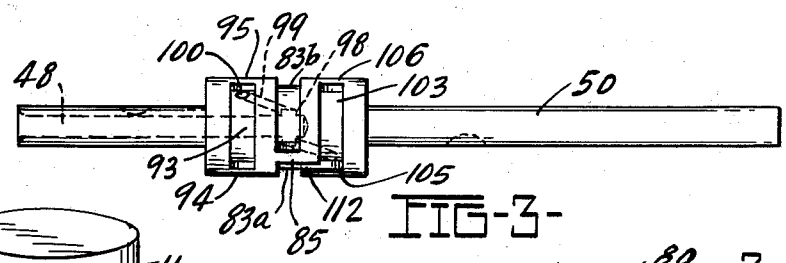


FIG-3-

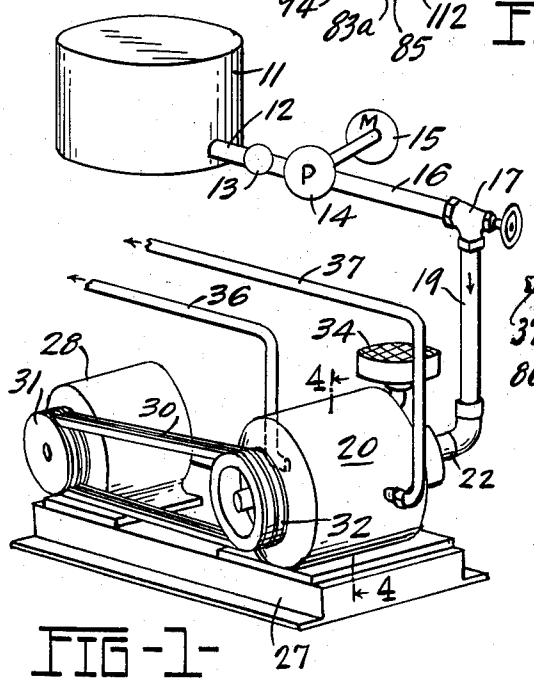


FIG-1-

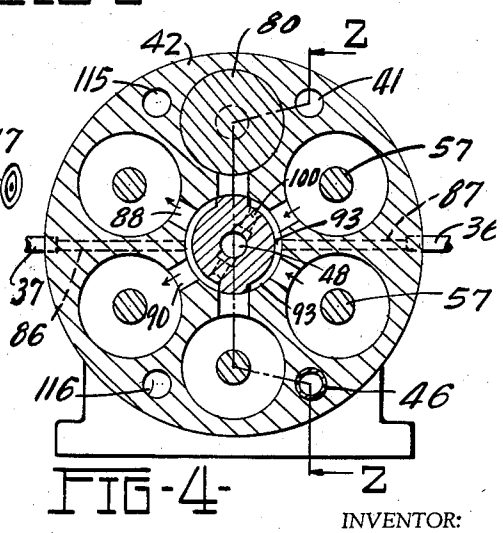


FIG-4-

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ATOMIZING PUMP

Filed Sept. 2, 1958 2 Sheets-Sheet 2

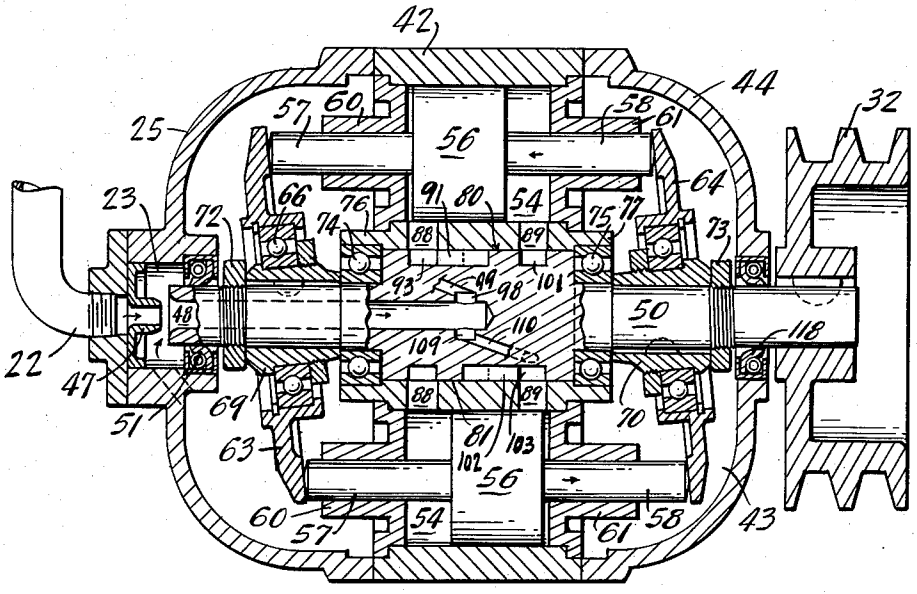


FIG-5-

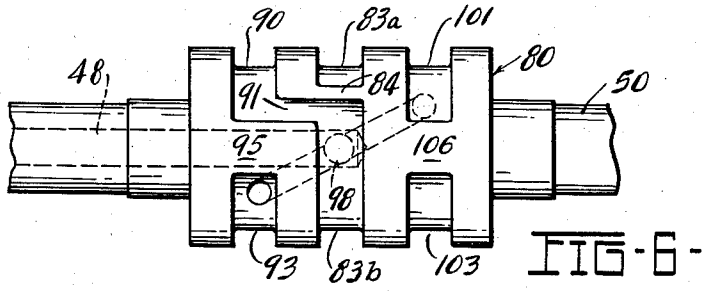


FIG-6-

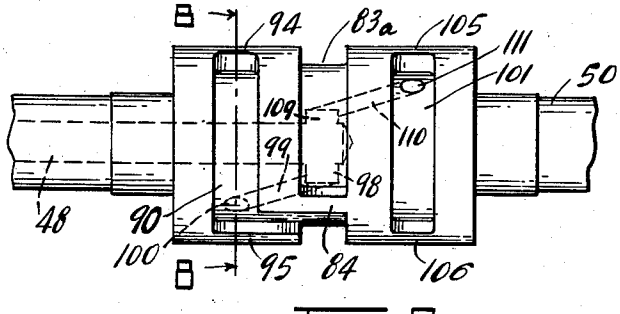


FIG-7-

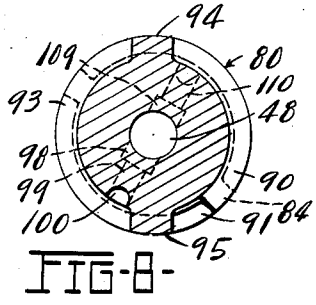


FIG-8-

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United States Patent Office

2,982,215

Patented May 2, 1961

2,982,215

ATOMIZING PUMP

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Filed Sept. 2, 1958, Ser. No. 758,201

11 Claims. (Cl. 103—5)

This invention relates to a positive displacement pump for creating a continuous flow of air borne particles of an atomized liquid. More specifically this invention pertains to a pump for receiving air and liquid, intermixing the air and liquid, compressing the resulting mixture of air and liquid, and delivering the compressed air with the liquid atomized and dispersed therein.

The pump of this invention is particularly adapted to the atomization of heavy oils and delivering the oils in atomized and air-borne state to burners for combustion purposes.

For best results, fuel oil should be finely divided in atomized form. The oil should be so finely comminuted that when it is discharged into the firepot of a warm-air furnace or a steam or hot-water boiler, it will burn readily and completely with intense heat. The efficiency of burning, that is, the completeness of combustion of an oil fuel, depends to a very large extent on how completely the oil is atomized. If an oil fuel is burned in the form of a coarse spray, a thick black smoke will indicate imperfect combustion.

Also, for the complete combustion of oil fuel, it is necessary that an adequate air supply be available so that every particle of oil, however small, may be surrounded by an adequate quantity of air. The thorough mixing of the air supply with the vaporized oil fuel is a very important matter in the designing of any system of oil burning. If the distribution of the air supply is not properly arranged so that it will reach every particle of the oil vapor, there will be only partial combustion.

Theorically about fourteen hundred cubic feet of air is required for supplying the oxygen consumed in the burning of one gallon of oil. In practice twenty one hundred cubic feet of air is usually found necessary due to the proportion of air not utilized and which escapes up the flue with the combustion gases.

The lighter, more highly refined fuel oils of grades such as Nos. 2 and 3 are generally utilized in domestic and industrial heating operations. Such oils have lower viscosities which make them more easily atomized. They are also chemically purer which lowers their corroding effect and aids their complete combustion. The equipment designed for these lighter oils are not capable of handling oils of the grades Nos. 5 and 6 which approach in composition basic crude oils. The greater viscosity of these heavier oils is such that the standard equipment will not adequately atomize them. This lack of effective atomization causes poor combustion with accompanying black smoking. There is a consequential loss in efficiency as well as objectable coking of burners, walls and stacks associated with the combustion chamber. Constant inspection, cleaning and unclogging of nozzles would accordingly be required to maintain the equipment in working order.

Because of their lower refining cost, the heavy oils are available at prices that make their effective use most economical. At the same time they produce more heat per gallon as they possess a higher calorific value. This adds to the savings in their use.

The most common design of burner for lighter oils includes a pressure atomizing nozzle to which the oil is fed by a small pump, and a blower for delivering air for combustion. Other types have nozzles in which air or steam under pressure eject the oil in spray form. Also, quite common are rotating discs which break the oil down to fine particles by centrifugal force. Another form of oil burner employs a rotary pump into which the air and fuel are drawn, mixed and discharged therefrom in a rather coarse spray. The pressure of the air and oil combination issuing from this pump has a pressure of three to five pounds per cubic foot.

All of these various designs have drawbacks in efficiency, capacity or operation which make them unsatisfactory for handling heavy fuel oils. This has been found to be the case even where pre-heating devices have been incorporated in the equipment to assist in vaporizing the fuel.

A more positive, uniform and dependable preparation and delivery of heavy fuel oils for combustion than was obtained by such conventional designs of equipment was made possible by the reciprocating piston arrangement in the apparatus disclosed in my U.S. Patent No. 2,412,383. The advent of this apparatus greatly broadened the possibilities of using the less refined petroleum products for both domestic and industrial heating.

The intermixture of the oil and air and the forceful supply of the atomized mixture provided by this apparatus proved to be a very effective system. However, there have been some irregularities and a lack of completely satisfactory results in the performance of this earlier equipment and it is a prime object of this invention to provide a pump component which overcomes these deficiencies and otherwise functions in an improved manner.

More specifically it is an object of this invention to improve the atomization of the oil and even flow of the particles of oil carried by the air through the pumping device.

A further object is to provide a pump that is not so susceptible to break down from wear and the chemicals usually present in the heavier, less purified grades of petroleum fuels.

The features of the structure of the invention which contribute to the attainment of these objects include immediate encompassing of the oil with air, the feeding of the oil and air within an axial passage within the rotating shaft of the pump, the design of the passages in the valve portion of the shaft, balanced pressures against the shaft, a higher compression, the pick-up of leaking oil by the entering air, and the wobble plate arrangement.

Additional objects and advantages of my improved pump will be made apparent in the following description in association with the accompanying drawings in which:

Figure 1 is a rather diagrammatic, perspective view of a fuel supply system incorporating one embodiment of a pump of this invention;

Figure 2 is a longitudinal, vertical section of the pump of Figure 1 taken on the line 2—2 of Figure 4;

Figure 3 is a side elevation of the shaft and valve assembly of the pump shown in the preceding figures;

Figure 4 is a cross section of the pump taken on the line 4—4 of Figures 1 and 2;

Figure 5 is a longitudinal, vertical section of the pump with the shaft and valve assembly and the pistons in positions slightly before the positions reached by these elements as shown in Figure 2;

Figure 6 is a partial elevation of the shaft and valve assembly in a different position than previously illustrated;

Figure 7 is a similar view of the shaft and valve assem-

bly turned back about ninety degrees from the position of Figure 6; and

Figure 8 is a cross section of the valve portion of the shaft assembly taken on the line 8—8 of Figure 7.

Referring to the drawings in more detail, the oil equipment of Figure 1 includes a supply tank **11** from which the oil is drawn through piping **12** and strainer **13**. A delivery pump **14**, driven by motor **15**, forces the oil along piping **16** to a metering valve **17**. By adjustment of this valve the amount of oil continuing down stand pipe **19** to the atomizing pump **20** may be varied. This variation in flow is made possible by a spring controlled by-pass from the discharge side back to the inlet side of delivery pump **14** or by employing a pump design with internal clearance permitting lower discharge under built-up pressure on the outlet side.

The oil passes through an inlet connection **22** to mixing chamber **23** at the center of end belt **25** of the atomizing pump **20**. As illustrated in Figure 1, the pump **20** is mounted on base **27** with motor **28** by which it is driven by a pair of V belts **30** running between sheaves **31** and **32**. The motor may in this case be five horse-power which would possess a good reserve of power at maximum speeds and pressures.

As the pump is operated, atmospheric air is drawn therein through air filter **34**. This air is mixed and compressed with the oil and is discharged by the pump carrying the oil in atomized form. In the disclosed embodiment of the pump air borne oil particles, which in effect constitute an oil aerosol, are discharged into two delivery tubings **36** and **37** connected to the sides of the pump and the oil aerosol is conveyed thereby to the burners of the associated heating apparatus.

As may be seen by referring to the sectional view of Figure 2 the air passing through the air filter **34** enters the end bell **25** through inlet nipple **39**. The air then proceeds through several horizontal borings such as **41** (also **115** and **116** as shown in Figure 4) through the body casting **42** of the pump into the chamber **43** within the opposite end bell **44**. This air movement helps dissipate the heat generated by the compression action of the pump. Air leakage from chamber **43** around shaft **50** is prevented by air seal **118**.

The air flows from chamber **43** into tube **46**, which projects into the bottom of the chamber through the pump body casting **42**. Tube **46** conveys the air to mixing chamber **23**. The air immediately surrounds the oil emitted from nipple **47** and with the oil enters the axial passage **48** in shaft **50**. The annular area between the end of the shaft and chamber **23** is closed by the rotary seal **51**.

The particular embodiment of the pump of this invention selected for portrayal has six cylinders **54** in a circular arrangement within the pump body **42**. A double-ended piston **56** is positioned for reciprocating motion within each cylinder. Piston rods **57** and **58** integral with the pistons project from opposite ends through cylinder heads **60** and **61**.

The pistons are motivated by wobble plates **63** and **64** which are tipped back and forth progressively about their peripheries while maintained in mutually parallel relation. The wobble movement of plates **63** and **64** is derived from their mounting through bearings **66** and **67** on the eccentric bushings **69** and **70** fixed upon opposite ends of shaft **50**.

The plates **63** are held against the hardened ends of the piston rods **57** and **58** by nuts **72** and **73** threaded upon shaft **50**. As may be noted the ends of the rods are cone shaped with tapers complying with the angle of the wobble plates. The shaft **50** is held in position and supported for rotation by bearings **74** and **75** inserted in collars **76** and **77** of the body **42**.

The enlarged valve member **80** at the center of the shaft **50** is cylindrical in form and fits within a complementary bore **81** in the body **42**. For serving two burners the pump has the two separate delivery tubings **36** and **37**. To divide the flow of air borne oil particles into equal portions for the two tubings the distributing groove around the mid-section of the valve member **80** is divided into two parts **83***a* and **83***b* by lands **84** and **85**. The two parts of the groove communicate alternately with the opposed discharge passages **86** and **87** (see Figure 4) extending horizontally from bore **81** in the body to exterior connections to the tubings **36** and **37**.

Adjacent opposite ends of the cylinders **54** are two sets, **88** and **89**, of radial ports directed inwardly in line with grooves running circumferentially of the valve member **80**. There are two aligned grooves at each end of the member **80** separated circumferentially by lands. Groove **90** toward the left as seen in Figures 4, 5 and 6 is an outlet groove discharging oil and air, received from the cylinders through ports **88**, through cross channel **91** into the distributing groove **83***b*. On the opposite side of the valve member **80**, circumferentially from outlet groove **90**, is inlet groove **93** separated from groove **90** by lands **94** and **95**. Inlet groove **93** receives oil and air from the axial passage **48** in shaft **50** through a passage which has a first radial portion **98** and a second inclined portion **99**, the latter terminating with port **100**.

At the other end of the valve member **80**, turning in line with ports **89**, are circumferentially spaced inlet groove **101** and outlet groove **103**. These grooves are separated by lands **105** and **106**. Inlet groove **101** receives oil and air, for delivery through ports **89** to the cylinders, from the angled passage having a first section **109** radially extending from the axial passage **48** in shaft **50** and a second inclined section **110** terminating at port **111**.

The outlet groove **103** delivers the compressed air and oil mixture received from the cylinders through ports **89** to the distributing groove **83***a* by cross channel **112**.

Further structural features as well as additional details of the valving arrangement will be described hereafter in connection with the explanation of the operation of the selected embodiment of the invention.

For purposes of discussion the cylinders **54** of the disclosed atomizing pump **20** will be considered as having a bore of a two inch diameter and length of two and one half inches. As the pistons, which are one and one half inches long, are reciprocated substantially the full length of the cylinders the total displacement per complete revolution of the shaft **50** is approximately thirty eight cubic inches. At the recommended maximum speed of 2000 r.p.m. the displacement per hour is close to 2639 cubic feet. Figuring the efficiency at eighty percent the pump delivers 2112 cubic feet of air per hour.

As much as eighty gallons of oil per hour may be handled through a pump of this capacity. The proportion of oil to uncompressed air taken in by the pump at this rate would be as low as four tenths of one percent by volume. The pump will atomize equally well oil fed in a comparatively light quantity such as eight gallons per hour. At this low delivery the proportion of oil would be increased to four percent of the air volume.

The greatest advantages gained through the use of the pump of this invention is in the atomizing of heavy, viscous fuel oils such as grades Nos. 5 and 6 and even unrefined crude oils and the selected one of these oils would be stored in the supply tank **11** from which the oil is delivered to the pump. The main requisite is that the oil be of a nature to remain sufficiently fluid at the temperatures to which it may be submitted within the building involved to flow through piping **12**.

If for some reason heavy oils are not available, or light oils are for some reason preferred, such fuels may be handled in high quantities with excellent results in the subject equipment.

The delivery pump **14** should have a capacity in excess of normal use in order to assure an ample, constant flow of oil. Surging or interruptions in combustion are

thus avoided. Desirably a filter **13** is placed in the piping **12** in front of the pump to prevent any foreign particles from reaching the delivery pump **14** to interfere with its operation or the functioning of the atomizing pump **20**.

The exact amount of oil flow may be controlled by setting the opening of the metering valve **17**. Excess oil is then returned through a by-pass associated with pump **14** for recirculation therethrough.

Under the force of the delivery pressure the oil travels through the inlet connection **22** and emitted from nipple **47** through mixing chamber **23** in the end bell **25** of the pump **20**. Here the oil is immediately encompassed by air drawn by the suction of the pump **20** and with the air in surrounding relation enters into the axial passage **48** within the main pump shaft **50**.

The air amounting to at least twenty times the volume of oil is drawn from the atmosphere through air filter **34** and travels from within end bell **25** through horizontal borings **41**, **114** and **115** in the body casting **42** to chamber **43** within the other end bell **44**. This movement of the air acts to remove heat of compression from the casting. The air then flows downward and into the end of the tube **46** by which it is conveyed to the mixing chamber **23**. The end of tube lies at the extreme bottom of chamber **43** so any oil that has leaked past the pistons and starts to accumulate at this low point is picked up by the flow of air before it has reached more than a nominal volume and carried with the air along with regularly delivered oil into axial passage **48** in shaft **50**.

At the initial entrance of the oil and air into passage **48** the oil is in the form of a loose axial stream with the air in a heavy annular sheath around the stream. The wall of passage **48** turns with the high rotation of shaft **50** and immediately sets the moving mass of oil and air in a whirling, spiraling movement.

This action serves to break up the stream of oil and throws particles of the oil outwardly into the encompassing air. A homogeneous mixture of the oil and air is quickly established with a uniform dispersion of oil particles throughout the air. Since the volume of air is so much greater than that of the oil it may be visualized how each small drop or particle of oil may be carried along separately enclosed by air constituting in toto an oil aerosol.

To insure equal division of this oil aerosol the two exit ports from the axial passage **48** are placed opposite each other with straight radial bores **98** and **109**. The centrifugal force of the whirling mixture of air and oil aids in the effective projection thereof into these outlet passages. The oil aerosol entering bore **98** travels along an inclined continuation **99** of the passage through port **100** into inlet groove **93** which extends about 160° around the outer periphery of the valve member **80**. Port **100** is desirably placed at the forward or leading end of groove **93**; that is, the end in the direction in which the shaft **50** and valve member **80** is rotating, the rotation being clockwise as viewed from the left. This placement of the port **100** assists distribution of the oil aerosol along the groove as the rotary movement of the valve periphery is inclined to be faster than the like movement of the arriving aerosol.

From groove **93** the oil aerosol is forced through the radial ports **88** in the stationary body casting **42**. These ports in successive series of three are constantly in opposed communicating relation with the groove. From ports **88** the oil aerosol is drawn into the associated cylinders **54** in which the pistons are at the time being driven to the right, as viewed in the present drawings, by the inward twist of wobble plate **63** against piston rods **57**.

In the same manner and at the same time, the other division of the oil aerosol from axial passage **48** travels from the straight radial passage **109** along the inclined continuation **110** and out port **111** into groove **101**. From this groove the oil and air reaches the opposite or right hand ends of cylinders **54** through radial ports **89**.

While each division of the oil and air mixture is continuously and successively delivered to the six cylinders it may be noted that at any one point the aerosol of one division is entering the left ends of three cylinders while the aerosol of the other division is entering the right ends of the other three cylinders. The pistons in the first mentioned set of three cylinders will be in different stages of moving to the right while the pistons in the other set of three cylinders will be in different stages of moving to the left. Accordingly, the left end of the first three cylinders and the right end of the other three cylinders are in the suction or intake stage with the pistons moving away from said ends.

As each piston reaches the limit of its movement to the right the trailing end of inlet groove **93** which is terminated by land **94** passes the radial port **88** leading to the left end of the cylinder within which the piston is lodged. As the piston begins its movement back toward the left end of the cylinder, outlet groove **90** circumferentially in line with inlet groove **93** but positioned on the opposite side of valve member **80** turns into communication with the radial port **88**, following the passage across the port of land **94**.

Outlet groove **90** is long enough to remain in communcation with the said radial port **88** until the piston has reached the limit of its movement to the left. The oil aerosol previously drawn into the left end of the cylinder is thus compressed and driven from the cylinder by the piston movement into outlet groove **90**. From groove **90** the compressed aerosol is forced across channel **91** into the distributing groove **83***b* arcing around the center of valve **80**. Here it should be noted that the cross channel **91** is at the trailing end of groove **90**. In this position the comparative inertia of the oil aerosol arriving from ports **88** impels it toward this outlet end of groove **90**. This arrangement functions to speed the flow of aerosol along groove **90** and eliminates any blind spots in which precipitation of oil from the air may occur. It is comparable to the placement of port **100** at the leading end of groove **93** which utilizes the inertia of the oil and air to fill groove **93**, and to eliminate stagnant areas therein. The rapid flow of the oil aerosol through the valve grooves wipes from the walls of the grooves any oil particles inclined to stick thereto.

The parts **83***a* and **83***b* of distributing groove **83** are separated by closing lands **84** and **85**. From the groove **83***b* receiving the compressed aerosol the latter is propelled to one of the two horizontal outlet bores **86** and **87** extending to delivery tubings **36** and **37**.

The pressure at which the air and oil mixture is compressed depends largely upon the size of the burner nozzles. With restricted flow the pressure is of course greater. In practice the pressure usually ranges between four and twenty pounds. In any event the compressing action is a most important factor in creating and maintaining a fine dispersion of the oil in the carrying air. While the oil is atomized within the rotating axial passage **48** the compression of the air in the cylinders and the consequential expansion of the air leaving the cylinders and issuing from the burner nozzles greatly amplifies the fineness of atomization and is primarily responsible for the remarkable combustion properties of the resulting oil mist.

The velocity of the flow of aerosol from the pump is maintained at a high level by the small diameters of the outlet bores **86** and **87**, and of the delivery tubings **36** and **37**. The burner nozzles to which the aerosol is conveyed may be of a design suitable for natural or artificial fuel gases to which the oil aerosol produced by the subject atomizing pump is quite comparable in ease of combustion.

As the atomizing and carrying air combined with the

oil would ordinarily only amount to thirty to three hundred cubic feet for each gallon of oil it is necessary to supply the main combustion air around the burner nozzles. This air combined with the air carrying the oil should make about 2000 cubic feet per gallon of oil. This additional air is readily intermixed with the aerosol as the action is like that of combining two gases. The standard whirling and vane-directing arrangement for delivering combustion air serves very effectively for this purpose.

For large industrial installation it is preferable to have the valve portion and delivery passages of the dump designed specifically for the particular number of burner nozzles involved. In the disclosed embodiment, as described, the pump structure is adapted to feed the aerosol fuel to two lines, each leading to a single nozzle.

Should it be desired to have four outlets from the disclosed pump, uniform distribution of the aerosol would be better assured by dividing outlet grooves **90** and **103** at their mid-points and furnishing each division with a cross connection, such as channel **91** or **112**, to the center distributing groove **83**. The latter would then be separated into four equal parts.

However, the aerosol created by this invention is sufficiently stable to sustain itself through a distributing manifold by which the aerosol stream may be divided to feed additional burner nozzles.

While force feed of the oil is desirable, gravity alone may be relied upon in many cases for the delivery of the fuel oil from a reservoir such as tank **11**. It is of course not possible to control the rate of feed as accurately or within as wide a range when depending upon gravity. Further, the gravity-included flow of the heaviest oils may be inadequate.

With the valving mechanism carried upon the shaft it is important that the forces which are brought to bear upon the shaft be as balanced as possible. Otherwise, bending of the shaft will promote leaking and by-passing between valve passages.

The wobble plates **63** and **64** are arranged to promote this balancing purpose. Through their parallel relation they are exerting compressing force on opposite sides of the shaft. In addition they are fitted tightly against the ends of the piston rods **57** and **58** whereby stress is interchanged between them. Being inclined at a moderate angle, which may for example be seventeen degrees, the thrust against them has minimum leverage. The valve passages are also symmetrically positioned, with the distributing groove **83** around the full center of the shaft, to even out air compression forces against the shaft.

The wide range in the quantity of oil which a pump of this invention will effectively atomize and deliver makes it adaptable to a situation where the heating requirements vary from time to time. Standard automatic controls may be utilized to change the delivery rate to accommodate different conditions reported by thermal or electrical instruments. Such versatility is not available with other commercial burners except in connection with the more expensive light oil or gaseous fuels.

While six cylinders of a particular size are described herein, it is of course obvious that my invention may be embodied in pumps having a greater or lesser number of cylinders and pistons and which may be built in a wide assortment of sizes. However, from the standpoint of even flow, higher numbers of such components are recommended.

The principal features of the invention believed to be responsible for the attainment of the recited objects as well as of other advantages brought out herein, include:

(*a*) the immediate encirclement of the oil by air as the oil reaches the pump whereby the oil is at once insulated from direct contact with passages of the pump;

(*b*) the introduction of the stream of oil with the surrounding sheath of air into the axial chamber within the shaft, whereby a whirling action is given the oil and air and the oil is atomized by the centrifugal action against and into the surrounding air;

(*c*) the discharge of the oil and air mixture from the axial passage through directly opposed radial outlets whereby an equal division of the mixture is obtained;

(*d*) the ports into the inlet grooves being at the leading ends of the grooves which assures fast, full-length flow along the grooves of the arriving oil and air mixture due to the inertia thereof;

(*e*) the outlet channels at the trailing ends of the outlet grooves which effects fast flow therethrough of the compressed aerosol;

(*f*) the general arrangement of valve passages which eliminates pockets, minimizes lost-space areas in communication with the cylinders, and contributes to even flow and equal division of the aerosol;

(*g*) the flow of incoming air into the tube starting at the bottom of the interior of the pump whereby leaking oil is not permitted to accumulate to interfere with the pump operation; and

(*h*) the mounting and design of the wobble plates which contributes to the balancing of pressures against the shaft and the valve member on the shaft.

It is to be understood that the form of the invention as disclosed herein is a preferred embodiment, but that many modifications and substitutions may be made therein without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. An atomizing pump for creating and delivering an aerosol of fuel oil including a main body, a bore through the body, a drive shaft extending into the bore, an annular series of cylinders in the body in parallel, surrounding relation to the drive shaft, discharge openings in the cylinders, pistons within the cylinders, means mounted on the shaft and having driving engagement with the pistons, said means being oscillated by rotation of the shaft to reciprocate the pistons, ports in the body between the bore and the cylinders, a comparatively narrow axial passage in the drive shaft extending from one end of the shaft to the vicinity of the ports and terminating at approximately the longitudinal center of the shaft, radially extending passages from the axial passage in a common circumferential zone of the axial passage which are periodically in register with the ports during rotation of the shaft, means exterior to one end of the shaft forming passageways for directing an outer sheath of air and inner jet of fuel oil into the axial passage of the shaft, and power means connected to the shaft for rotating the shaft and thus reciprocating the pistons whereby the air and fuel oil are thrown into a whirling mixture within the axial passage and are drawn together by the suction of the reciprocating pistons through the radially extending passages from the axial passage and through the ports into the cylinders and the mixture of air and oil is then compressed by the pistons and emitted from the cylinders through the discharge openings.

2. An atomizing pump according to claim 1 in which the means oscillated by rotation of the shaft to reciprocate the pistons include wobble plates in parallel relation on opposite ends of the cylinders, piston rods extending from each end of the pistons into contact with the wobble plates, and eccentric bushings fixed to the shaft on which the wobble plates are carried.

3. In a pump for compressing a mixture of fuel oil and air to create a readily combustible aerosol of fuel oil, a cylinder, a reciprocable piston within the cylinder, a drive shaft, power means connected to the shaft for rotating the shaft, means motivated by rotation of the drive shaft for reciprocating the piston, an axial passage within the shaft, means including an oil supply tank, an oil pump and providing passageways for directing a jet of fuel oil and an annular sheath of air into one end of the passage, a radial outlet from the other end of the

passage, means providing a path for the fuel oil and air from the radial outlet to the cylinder whereby the fuel oil and air are drawn to the cylinder by suction movement of the piston and compressed together by the following compression movement of the piston, and there is a discharge passage from the cylinder for delivery of the compressed mixture of fuel oil and air to a burner nozzle.

4. An atomizing pump for creating and delivering an aerosol of fuel oil including cylinder and piston means for drawing in and compressing a mixture of fuel oil and air, piston rods projecting from the cylinder means, a drive shaft, power driven means connected to the shaft for rotating the shaft, piston reciprocating means in contact with the rods, said reciprocating means including wobble plates mounted on the drive shaft and actuated by rotation of the drive shaft, a portion of the drive shaft constituting a rotary valve controlling inlet and outlet passages to the cylinder means, an axial passage within the shaft leading to the rotary valve and being open at one end of the shaft, and means including passageways and a fuel oil discharge nozzle for directing fuel oil and air into the open end of the axial passage.

5. An atomizing pump according to claim 4 in which the means directing fuel oil and air into the axial passage directs the fuel oil in a central stream encompassed by an annular sheath of air.

6. An atomizing pump according to claim 4 in which there are radial passages from the axial passage leading to the rotary valve, said radial passages being positioned diametrically opposite each other across the axial passage.

7. An atomizing pump according to claim 4 in which the rotary valve has a circumferentially extending groove with a port communicating with the axial passage, said port being located at the leading end of the groove as the groove follows the rotation of the rotary valve.

8. An atomizing pump according to claim 4 in which the rotary valve has a circumferentially extending groove arranged to receive a compressed mixture of fuel oil and air from the cylinder means, an outlet from the groove for discharging the compressed mixture therefrom, said outlet being located at the trailing end of the groove as it follows the rotation of the rotary valve.

9. An atomizing pump according to claim 4 having a hollow casing and the means introducing fuel oil and air into the axial passage includes an air tube extending from the bottom of the hollow casing whereby flow of air into the tube is inclined to pick up any oil from leaks collecting at the bottom of the hollow casing.

10. An atomizing pump according to claim 4 in which the rotary valve has a first circumferentially extending, exterior groove receiving oil and air from the axial passage for delivery to the cylinder means, and has a second circumferentially extending, exterior groove circumferentially in line with said first groove for receiving compressed oil and air from the cylinder means for delivery to a distributing passage leading to a burner nozzle.

11. In a pump for compressing a mixture of fuel oil and air to create a readily combustible aerosol of fuel oil, a cylinder, a reciprocable piston within the cylinder, a drive shaft, power means connected to the shaft for rotating the shaft, means motivated by rotation of the drive shaft for reciprocating the piston, an axial passage extending from one end of the shaft to near the longitudinal center thereof, an air chamber enclosing the end of the shaft from which the axial passage extends, an oil discharge nozzle projecting into said chamber and positioned in alignment with the axial passage, means for forcing a stream of oil from the discharge nozzle into the axial passage, the discharge nozzle being so positioned relative to the axial passage that air from the chamber moves into the axial passage with the stream of oil from the discharge nozzle, a radial outlet from the inner end of the axial passage, means providing a path for the fuel oil and air from the radial outlet to the cylinder whereby the fuel oil and air are drawn to the cylinder by suction movement of the piston and compressed together by the following compression movement of the piston, and there is a discharge passage from the cylinder for delivery of the compressed mixture of fuel oil and air to a burner nozzle.

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