

May 17, 1938.

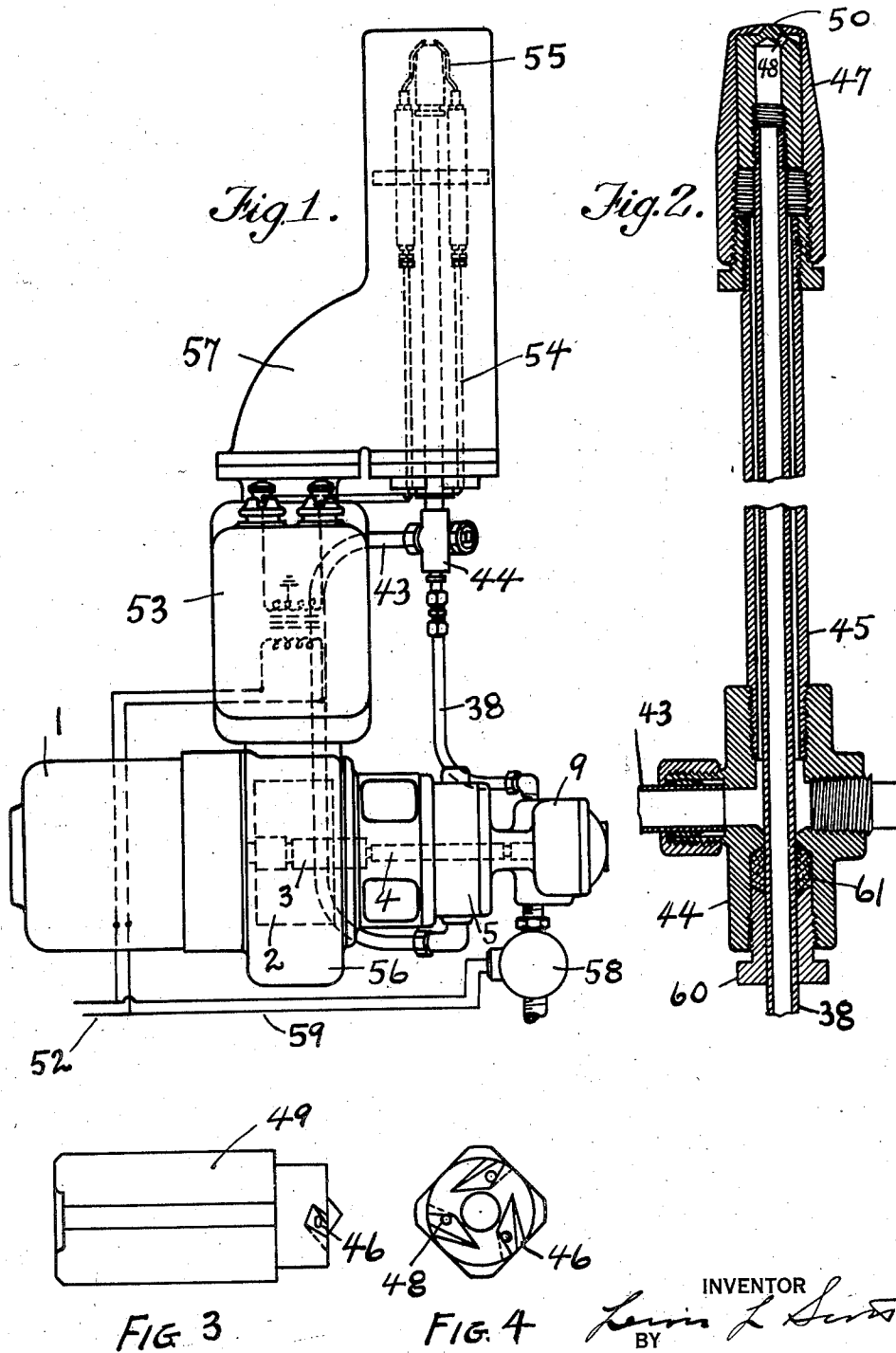
L. L. SCOTT

2,117,512

OIL BURNER

Filed March 28, 1935

4 Sheets-Sheet 1



INVENTOR

BY

ATTORNEY

May 17, 1938.

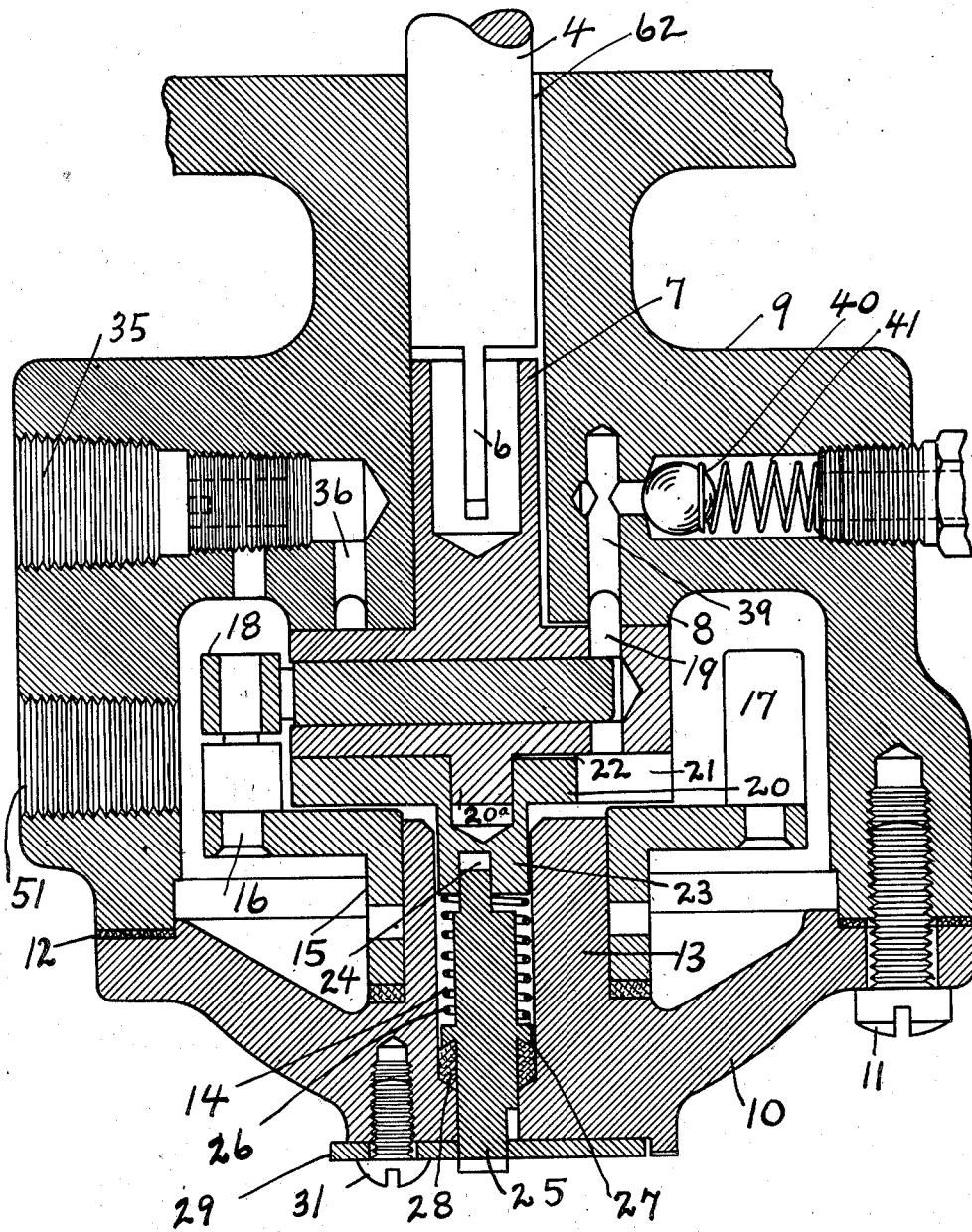
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May 17, 1938.

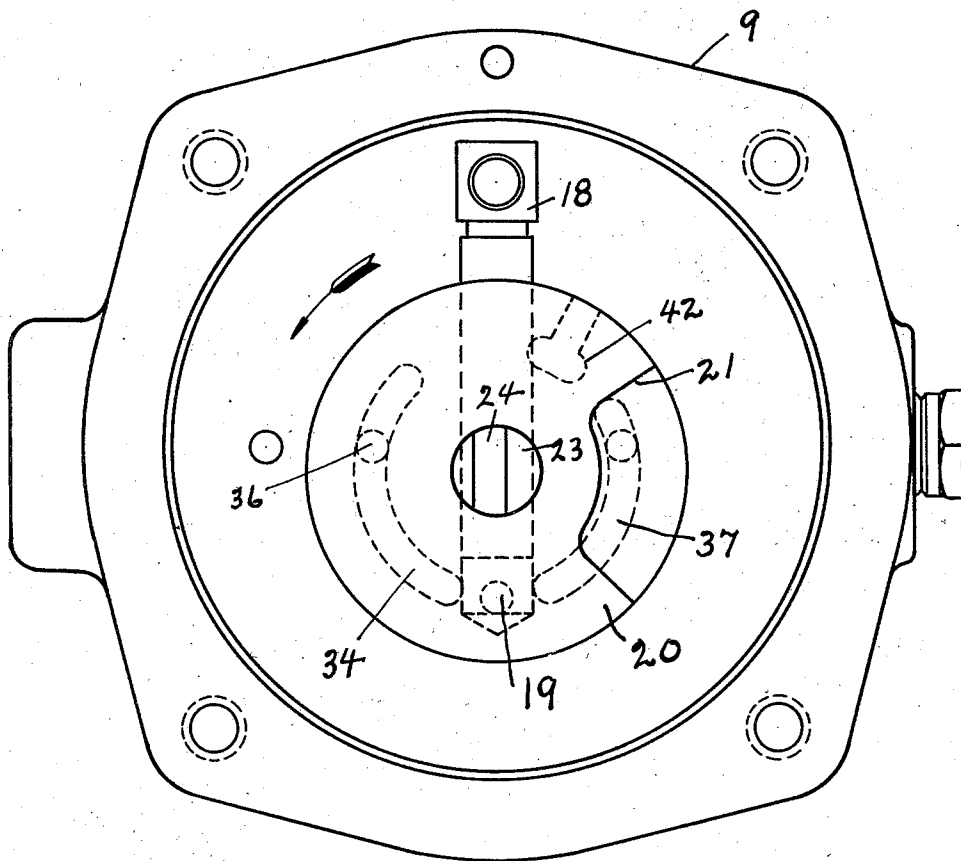
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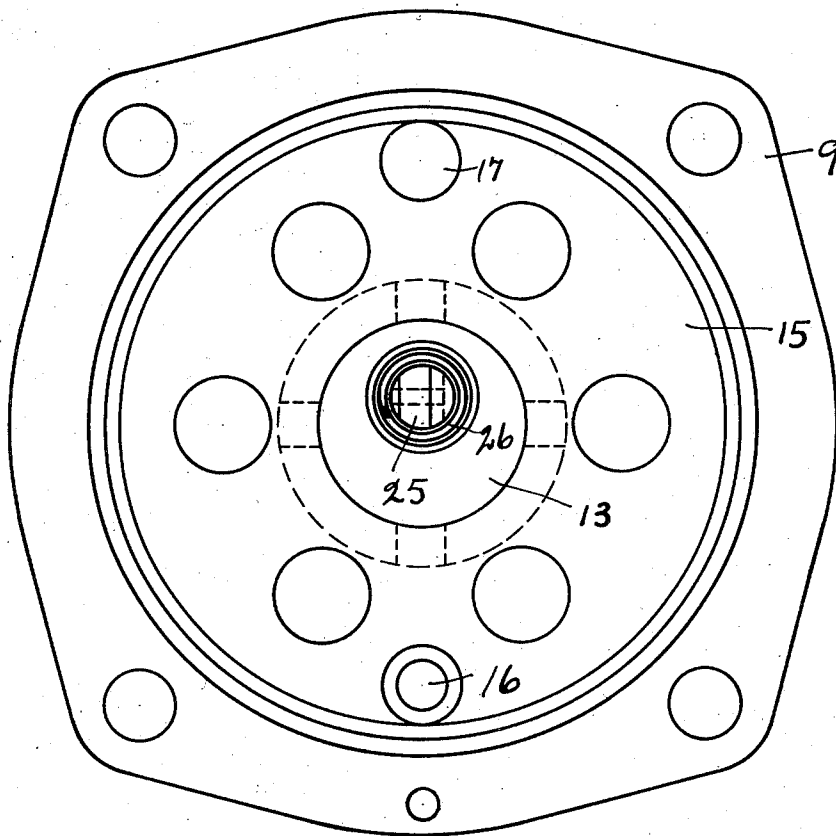


FIG. 8

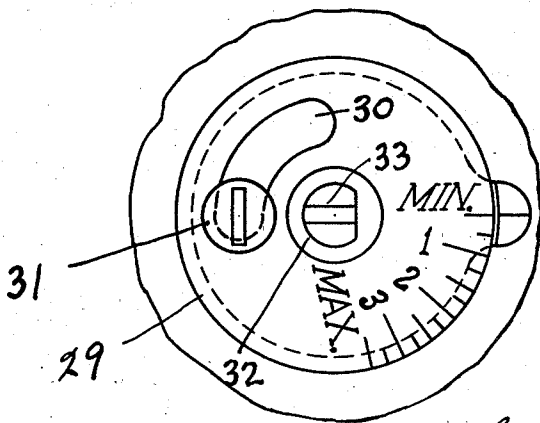


FIG. 7

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UNITED STATES PATENT OFFICE

2,117,512

OIL BURNER

Lewis L. Scott, St. Louis, Mo.

Application March 28, 1935, Serial No. 13,470

12 Claims. (Cl. 103-160)

This invention relates to oil burners particularly adapted to the heating of homes where said oil burner is installed in a heating plant. One of the objects of my invention is to make a simple and improved oil burner that can burn the heavier grades of oil reliably without pre-heating.

Another object of my invention is to provide a means of accurately measuring the oil delivered to the spray nozzle by use of a pump whereby said pump can be manually adjusted for various deliveries without changing the stroke or diameter of the pump, and without resorting to the well known type of bypass valves.

Another object of my invention is to arrange the oil pump so that very small oil rates can be had, such as one-half gallon per hour, delivered through the spray nozzle, and to arrange said pump so that oil can be lifted from an underground tank even when the pump is delivering oil at the rate of one-half gallon to the spray nozzle.

My method of atomizing the oil consists of the use of a low pressure air compressor delivering air at the nozzle at between one and two pounds pressure, whereby said air is caused to swirl and mix with the oil, and said mixture delivered to the orifice of the spray nozzle in a finely atomized state.

Another object of my invention is to provide a separate tube running directly from the oil pump to the interior of the spray nozzle so that the main volume of oil delivered to the spray nozzle is carried through a separate oil tube.

Another object of my invention is to provide a small bypass leak from the delivery side of the oil pump so as to lubricate the air compressor and its bearings.

Various other objects and advantages will be apparent from the following description of the embodiment of my invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

The accompanying drawings illustrate my invention. Figure 1 represents a plan view of my complete oil burner showing the electric wires running to the motor and other accessories.

Figure 2 shows an enlarged sectional view of my spray nozzle together with the pipes for conducting the oil and air to said nozzle.

Figure 3 is a side elevation of the interior core of my spray nozzle.

Figure 4 is a front end view of Figure 3.

Figure 5 is an enlarged cross sectional view of my oil pump.

Figure 6 is an end view of my oil pump with the

end plate and rotating eccentric removed, showing some of the interior parts of the pump.

Figure 7 is an end fragmentary view of the end plate of the pump showing the means for adjusting the capacity or volume of said pump.

Figure 8 is an end view of the end plate of the pump, together with the rotating eccentric mounted on said end plate, said view being shown looking at the inside of the end plate.

Referring now to the drawings, the numeral 1 indicates an electric motor which operates an air blower 2. On the shaft of the motor is a flexible coupling 3 which drives the rotor shaft 4 of the air compressor 5. The air compressor 5 can be of any well known rotary type and forms no part specifically of this invention. The end of the shaft 4 is provided with a screw driver extension 6 which fits into a slot in the shaft of the oil pump rotor 7. Said rotor 7 is nicely seated on the interior face 8 of the oil pump body 9 so as to form a perfect joint. The end plate casting 10 is secured to the pump housing 9 by screws 11 and is provided with a gasket 12 to effect a tight joint between the pump body and said end plate. End plate 10 has a projecting hub 13, which hub has an interior hole 14 formed concentric with the drive shaft 4. The outside of the hub 13 is machined eccentric to the hole 14. On the exterior of the hub 13 is mounted a rotating member 15 which carries a crank pin 16 and a counter balance weight 17 arranged opposite the crank pin 16. On the end of the crank pin 16 is mounted the pump plunger 18, adapted to reciprocate in the nicely fitted bore in the pump rotor 7. Near the end of the bore in the pump rotor 7 in which the piston 18 reciprocates is a small hole 19, which is drilled through the pump rotor 7 at right angles to the cylindrical bore carrying the piston 18. On the lower side of the pump rotor 7 is mounted a normally stationary plate 20, which plate is centered by the extension 20a on pump rotor 7. The plate 20 is accurately ground to the lower surface of the pump rotor 7, and said plate is provided with a slot 21 (see Figures 5 and 6), also an oil groove 22 for carrying oil to the surfaces between the lower side of the rotor 7 and the upper side of the plate 20. The plate 20 is provided with an extending hub 23 in which is formed a slot 24, said slot being engaged by a screw driver extension formed on the shaft 25. A spring 26 is mounted around the upper end of shaft 25 and bears against the extending hub 23. The shaft 25 is provided with an enlarged shoulder 27 which bears against the spring 26 so that said spring 26 presses the plate 20 firmly against 55

the lower side of the rotor 7. The numeral 28 indicates packing mounted around the shaft 25 between the shoulder 27 and the interior of the head 10. The numeral 29 indicates a fuel adjusting plate (see Figures 5 and 7), which plate is provided with an elongated slot 30 through which the screw 31 projects, which screw is threaded into the head 10. The fuel adjusting plate 29 is provided with a hole 32 at its center, which hole is flat on one side so as to fit on the corresponding flat side on the shaft 25. The shaft 25 is provided with a screw driver slot 33 so that by loosening the screw 31 shaft 25 may be partially rotated for the purpose of adjusting the quantity of fuel delivered to the spray nozzle, the details of which will be later described. The pump housing 9 is provided on the face 8 with an intake port 34 (see Figure 6), which communicates with the suction connection 35 (formed in the pump body 9), through hole 36. The numeral 37 (see Figure 6) indicates a discharge port formed in the face of the pump body 9. Said port communicates with the fuel tube 38 through the hole 39 and check valve 40. The check valve 40 is held against its seat by the spring 41. The numeral 42 (see Figure 6) indicates a relief port also formed in the face of the pump body 9 and adjacent the end of the discharge port 37 but communicating with the interior of the pump body 9, the purpose of said port being to prevent forming high pressure between the member 20 and the pump rotor 7 during a certain portion of the discharge period of the pump. The relief port 42 is to prevent hammering action of the member 20 during a part of the pressure stroke. The discharge recess 37 cannot be made much longer than that shown on the drawings, Fig. 6, without lengthening the cut-out portion 21 on the member 20 and if this cut-out portion were lengthened it would overlap the suction port 34 when the part 20 is adjusted for maximum gallonage to be delivered to the burner nozzle. Unless, therefore, such a relief measure as the port 42 is provided a decided hammering action will result since there would be no exit for the discharge of oil during a portion of the pressure stroke.

When the shaft 4 is revolved by the motor 1, the air compressor 5 delivers air through the tube 43 to the T 44, and said air is delivered in the space between the oil tube 38 and the air tube 45 to the spiral slots 46 (see Figures 3 and 4) to the interior whirling chamber of the nozzle tip 47, where said air rapidly swirls in the whirling chamber and mixes with oil delivered from the pump through the tube 38 and through holes 48, which holes communicate with the air slots 46 formed in the core 49 in the spray nozzle whereby a finely atomized spray of oil and air will be delivered through the orifice 50 of said spray nozzle. The shaft 4 will rotate the pump rotor 7 and will also rotate the rotating member 15, and because the axis of said member is not concentric with the shaft 4, as before described, the piston 18 will reciprocate in the bore provided for it in the pump rotor 7. During the suction stroke of the pump, the hole 19 in pump rotor 7 will be in communication with the intake port 34, and oil will be sucked from the oil tank (not shown) into the space between the piston 18 and the bottom of the bore in which said piston fits in the pump rotor 7. As the shaft 4 continues to rotate, the pump plunger 18 will move into the bore in which it fits in the pump rotor 7 and the hole 19 will communicate with the discharge port 37 so that oil will be delivered to the fuel pipe 38 as before de-

scribed. The location of the slot in the plate 20 will determine the volume of oil that will be delivered to the fuel pipe 38 and the remaining volume of oil that will be delivered to the interior chamber of the pump housing 9 and back to the fuel tank through connection 51. In the position shown in Figure 6, the hole 19 in the pump rotor 7 is just about to communicate with discharge port 37 and the plate 20 is in a position to deliver the minimum quantity of oil to fuel pipe 38. It will be seen that rotating the plate 20, with the adjacent plate 29 counterclockwise (see Figure 7) a greater quantity of fuel will be delivered to the fuel pipe 38 and a smaller quantity will be delivered to the interior chamber of the pump housing 9. By this arrangement I can get any delivery of oil between the minimum and maximum capacity that is desired without changing the stroke of the pump or the diameter of the pump piston, and without in any way reducing the ability of the pump to lift oil from an underground tank.

Electric current from the power wires 52 is supplied to the motor 1 and the primary side of the ignition transformer 53. The numeral 54 indicates the high tension terminals of the said transformer 53 which lead to the ignition points 55, which points are located adjacent to the spray nozzle 47 for igniting the fuel. Secondary air from the blower 2 is conducted through the housing 56 to the air blast tube 57 where it is delivered and mixed with the atomized fuel spray from the spray nozzle 47. The numeral 58 indicates a magnetic valve located in the suction of the oil line and which is connected to the power wires 52 by wires 59. The valve 58 is adapted to open and permit oil to flow to the oil pump when the current is turned on to the motor, and said valve closes when current is turned off.

The numeral 60 indicates a packing gland fitting around the fuel tube 38 which is adapted to screw into the T 44 and press the packing 61 around the fuel tube 38 to prevent an air leak from air pipe 43.

I provide a small groove 62 (see Figure 5) which groove permits a small portion of oil to be delivered from the delivery port 37 up around the shaft 4 and into the interior of the air compressor, lubricating same. The quantity of oil that goes into the air compressor in this way is relatively small and is finely atomized and passes out through the orifice 50 of the spray nozzle 47. I have found that by conducting the main body of the oil from the oil pump through a separate tube, such as 38, to the tip of the nozzle I avoid "puff backs" which are quite common where the oil and air are mixed together either in or near the air compressor, and the mixture of air and oil conducted to the nozzle.

I claim:—

1. An oil pump having a cylinder adapted to be rotated, a piston adapted to rotate with said cylinder and to reciprocate therein, means for causing the piston to reciprocate in said cylinder, a pump housing containing said parts having an inner wall to which the inner face of the pump cylinder is seated, an intake port and a discharge port in said wall, said ports being alternately connected to the space between the end of the piston and the end of the cylinder in which the piston reciprocates when said cylinder is revolving, means to deliver oil to the discharge port during only a part of its delivery stroke and to by-pass the oil during the remaining period of said delivery stroke, and a relief port adjacent the dis-

charge port and communicating with the interior of the pump housing arranged and adapted to prevent excessive pressure in the pump cylinder during a portion of the delivery stroke.

2. In an oil burner, an oil pump having a cylinder adapted to be rotated, a piston adapted to rotate with said cylinder and to reciprocate therein, means for causing the piston to reciprocate in said cylinder, a pump housing containing said parts having an inner wall to which the inner face of the pump cylinder is seated, an intake port and a discharge port in said wall, said ports being alternately connected to the space between the end of the piston and the end of the cylinder in which the piston reciprocates when said cylinder is revolving, an adjustable by-pass plate seated against the outer face of the pump cylinder, said by-pass plate having a small opening which communicates with the space between the end of the piston and the end of the cylinder in which said piston reciprocates, during a portion of the discharge stroke, a spring arranged to press the by-pass plate against the outer face of the pump cylinder, a shaft projecting through the pump housing adapted to engage the bypass plate so that said by-pass plate may be manually adjusted so as to change the ratio of the oil delivered to the burner as to the oil by-passed.

3. In an oil burner, an oil pump having a cylinder adapted to be rotated, a piston adapted to rotate with said cylinder and to reciprocate therein, means for causing the piston to reciprocate in said cylinder, a pump housing containing said parts having an inner wall to which the inner face of the pump cylinder is seated, an intake port and a discharge port in said wall, said ports being alternately connected to the space between the end of the piston and the end of the cylinder in which the piston reciprocates when said cylinder is revolving, an adjustable by-pass plate seated against the outer face of the pump cylinder, said by-pass plate having a small opening which communicates with the space between the end of the piston and the end of the cylinder in which said piston reciprocates, during a portion of the discharge stroke, a spring arranged to press the by-pass plate against the outer face of the pump cylinder, a shaft projecting through the pump housing adapted to engage the by-pass plate so that said by-pass plate may be manually adjusted so as to change the ratio of the oil delivered to the burner as to the oil by-passed, an indicator attached to the shaft so that when said shaft is adjusted the quantity of oil being delivered to the burner will be known.

4. A pump having a cylinder, a piston in the cylinder, means for revolving the cylinder, means for reciprocating the piston in the cylinder, means for communicating the cylinder with an intake line, means for communicating the cylinder with a delivery line, a port in said cylinder, a flat member normally stationary independent of said communicating means and having an elongated recess adapted to register with said port during a predetermined part of each delivery stroke to by-pass fluid during such part of each delivery stroke, and means for adjusting said member whereby the magnitude of such part may be varied at will.

5. A pump having a cylinder, a piston in the cylinder, means for revolving the cylinder, means for reciprocating the piston in the cylinder incident to said revolving, means for communicating the cylinder with an intake line, means for communicating the cylinder with a delivery line, a

port in said cylinder, and a flat member normally stationary independent of said communicating means and having an elongated recess adapted to register with said port during a single predetermined integral part of each delivery stroke to by-pass fluid during such part of each delivery stroke.

6. A fuel pump having a cylinder adapted to be rotated, a piston in the cylinder, means for reciprocating the piston incident to the rotation of the cylinder, a stationary plate against which the cylinder is seated, elongated recesses in the plate connected respectively with a suction line and a delivery line and communicating alternately with the cylinder upon its rotation, and a spring pressed plate opposite the aforesaid plate and having a recess adapted to communicate with the cylinder during a predetermined part of its delivery stroke to by-pass fuel during said part of the delivery stroke.

7. A fuel pump having a cylinder adapted to be rotated, a piston in the cylinder, means for reciprocating the piston incident to the rotation of the cylinder, a stationary plate against which the cylinder is seated, elongated recesses in the plate connected respectively with a suction line and a delivery line and communicating alternately with the cylinder upon its rotation, a spring pressed plate opposite the aforesaid plate and having a recess adapted to communicate with the cylinder during a predetermined part of its delivery stroke to by-pass fuel during said part of the delivery stroke, and means for adjusting the position of the plate whereby the magnitude of said part may be varied at will.

8. A fuel pump having a cylinder adapted to be rotated, a piston in the cylinder, means for reciprocating the piston incident to the rotation of the cylinder, a stationary plate against which the cylinder is seated, an elongated recess in the plate connecting with a delivery line and communicating with the cylinder during a part of the delivery stroke, means for communicating the cylinder with a suction line, a spring pressed plate opposite the aforesaid plate and having a recess adapted to communicate with the cylinder during a predetermined part of its delivery stroke to by-pass fuel during said part of the delivery stroke, and a relief port adjacent the delivery port arranged and adapted to communicate with the cylinder during a portion of the delivery stroke.

9. A fuel pump having a cylinder adapted to be rotated, a piston in the cylinder, means for reciprocating the piston incident to the rotation of the cylinder, a stationary plate against which the cylinder is seated, a delivery recess and a suction recess connected respectively with a delivery line and a suction line and communicating alternately with the cylinder upon its rotation, a relief port in the plate adjacent said delivery recess arranged and adapted to communicate with the cylinder during a portion of the delivery stroke, and a spring pressed plate opposite the aforesaid plate and having a recess adapted to communicate with the cylinder during a predetermined part of its delivery stroke to by-pass fuel during said part of the delivery stroke.

10. A pump having a housing, a cylinder adapted to rotate in said housing, a piston in the cylinder, means for reciprocating the piston in the cylinder incident to said rotation, said cylinder being seated against a wall of said housing and having a port opening thereto, recesses in

the wall connected respectively to a suction line and a delivery line through said wall and communicating alternately with said cylinder port, a by-pass plate seated against said cylinder opposite said housing wall and having a recess communicating with the cylinder during a part of the delivery stroke of the piston and discharging into said housing, and a by-pass line connected through a wall of the housing independent of the suction line.

11. A fuel pump having a cylinder adapted to be rotated, a piston in the cylinder, means for reciprocating the piston incident to the rotation of the cylinder, a stationary plate against which the cylinder is seated, elongated recesses in the plate connected respectively with a suction line and a delivery line and communicating alternately with the cylinder upon its rotation, a plate normally stationary opposite the aforesaid plate and having an elongated recess adapted to communicate with the cylinder during a portion of

its delivery stroke to by-pass fuel during said portion of the delivery stroke, and means for adjusting the position of the plate whereby the magnitude of said portion may be varied at will.

12. An oil pump having a cylinder adapted to be rotated, a piston adapted to be rotated with said cylinder, means for causing the piston to reciprocate in said cylinder, a pump housing containing aforesaid parts and having an inner wall to which the inner face of the cylinder is seated, an intake port and a discharge port in said wall arranged to be alternately connected to the end of the cylinder when said cylinder is revolved, an adjustable by-pass plate having an elongated port adapted to communicate with the cylinder during an integral portion of the discharge stroke, and means for adjusting the position of said plate so as to change the magnitude of said portion.

LEWIS L. SCOTT. 20