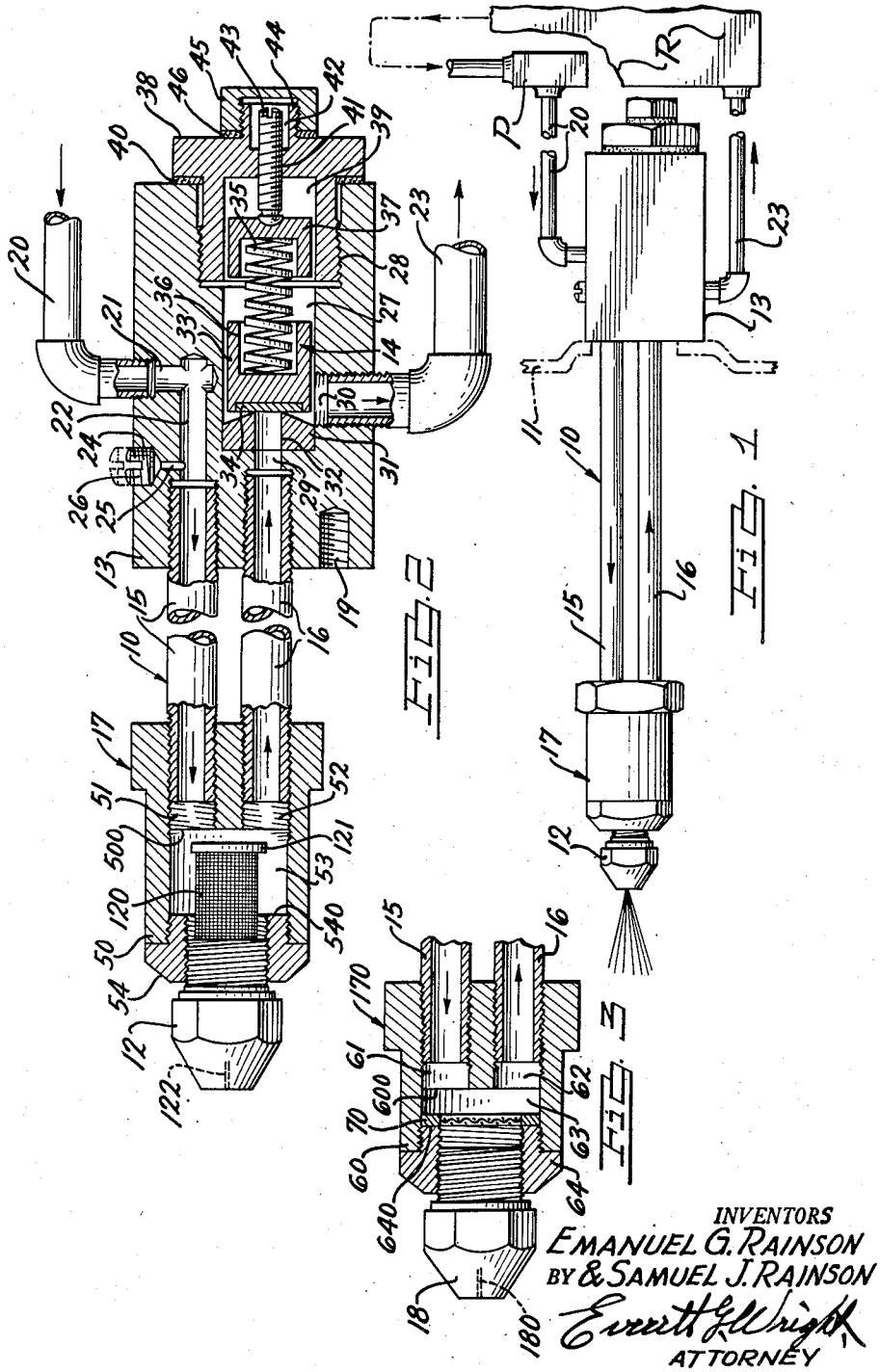
Feb. 26, 1957 E. G. RAINSON ET AL 2,783,087

CIRCULATING TYPE OIL BURNER

Filed Jan. 29, 1954



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United States Patent Office 2,783,087 Patented Feb. 26, 1957



2,783,087

# CIRCULATING TYPE OIL BURNER

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Application January 29, 1954, Serial No. 406,928

2 Claims. (Cl. 299—58)

This invention relates to oil burners of the oil circulating type including an improved pressure regulating self-cleaning and self-cooling nozzle holder.

Most pressure type oil burners employ a strainer at the fuel nozzle to prevent foreign particles in the fuel oil from clogging or otherwise obstructing the nozzle orifice. However, the strainer itself ofttimes becomes more or less obstructed by an accumulation of foreign matter causing a malfunctioning of the oil burner. Also, conventional oil burner nozzle orifices become blocked by an accumulation of carbon and tars resulting from excess heating of the nozzle assembly when the oil burner is in operation.

With the foregoing in view, the primary object of the invention is to provide in an oil burner an inexpensive and effective pressure regulated circulating oil type nozzle holder which is self-cleaning and self-cooling whereby to prevent undue clogging of the nozzle screen and nozzle orifice.

Another object of the invention is to provide a circulating oil type nozzle holder in which a small amount of fuel oil is maintained between the strainer and the nozzle orifice during the operation of the oil burner while a relatively large volume of oil is directed past the strainer whereby to clean the same and cool the nozzle.

Another object of this invention is to provide a circulating oil type oil burner including a nozzle holder through which considerably more oil passes than is jetted from the nozzle thereof and in which the nozzle strainer is constantly cleaned and cooled by excess fuel oil passing through the nozzle holder and past the strainer.

A further object of the invention is to provide in an oil circulating type oil burner a pressure regulated nozzle holder assembly which is readily installed in a conventional heat exchanger in which oil pressure is immediately built up when the fuel oil pump of the oil burner is started whereby to assure an immediate fine spray of oil from the nozzle, the nozzle holder being so constructed as to provide a small reservoir of strained fuel oil between the strainer and the nozzle orifice which is constantly replaced by clean oil which passes through the strainer, the strainer being maintained clean and the nozzle being cooled by oil in excess of that which is sprayed from the nozzle passing over and by the strainer as it circulates through the nozzle holder.

Other objects of the invention will become apparent by reference to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is an elevational view of an improved pressure regulating circulating oil burner nozzle holder assembly embodying the invention with the fuel oil reservoir and pump normally employed in connection therewith indicated more or less diagrammatically.

Fig. 2 is an enlarged longitudinal sectional view of the pressure regulating circulating oil burner nozzle holder assembly shown in Fig. 1.

Fig. 3 is an enlarged longitudinal sectional view of an alternate self-cleaning and self-cooling nozzle holder embodying the invention wherein a disc type oil strainer rather than a cylindrical type oil strainer is employed.



Referring now to the drawing wherein like numerals refer to like and corresponding parts throughout the several views, a nozzle holder assembly 10 illustrating the invention is shown in Fig. 1 mounted through an attaching flange 11 of a conventional heat exchanger and connected to a pump P and reservoir R in a manner to provide a circulating fuel oil system. The pump P is preferably started and stopped by thermostatic controls and fuel sprayed from the nozzle 12 into the heat exchanger is ingited by conventional means, not shown.

The nozzle holder assembly 10 preferably includes a mounting element 13 into which is incorporated a pressure regulating valve 14. An oil supply tube 15 and an oil return tube 16 is cantilevered from the mounting element 13 and is connected to and supports a nozzle holder 17 from the outer end of which extends the nozzle 12. The mounting element 13 may be secured to a heat exchanger attaching flange 11 by means of studs, not shown, which studs thread into tapped bores 19 in the mounting element 13.

The circulation of fuel oil to and through the nozzle holder 17 is shown in the drawing by flow indicating arrows. The pump P furnishes fuel oil from the reservoir R to the nozzle holder 17 through a pressure line 20, pressure passages 21 and 22 in the mounting element 13, and the oil supply tube 15 in a quantity greatly in excess of the capacity of the fuel oil to be discharged through the nozzle 12. All fuel oil except that which is discharged through the nozzle 12 is returned to the reservoir R from the nozzle holder 17 through the oil return tube 16, the pressure regulating valve 14 in the mounting element 13, and a return line 23. A tapped hole 24 and communicating passage 25 in the mounting element 13 communicates with the pressure passage 22 and provides means for connecting a pressure gage to the fuel oil supply if desired. If no pressure gage is employed, the tapped hole 24 is sealed with a threaded plug 26.

The mounting element 13 is bored to provide a valve chamber at 27 and is counterbored and threaded at 28 to accommodate adjusting mechanism for the pressure regulating valve 14. A bore 29 provides an inlet from the return tube 16 to the valve chamber 27 while a bore 30 provides an outlet from the side of the valve chamber 27 to the return oil line 23. At the base of the valve chamber 27 is a valve seat element 31 having an oil passage 32 therethrough communicating with the inlet bore 29 to the said valve chamber 27. The valve seat element 31 is so proportioned that the seat thereof is located opposite the outlet bore 30 communicating between the valve chamber 27 and the return oil line 23. A valve element 33 having a suitable seat facing 34 is reciprocatingly mounted in the valve chamber 27 and is urged in seated relationship onto the valve seat as shown in Fig. 2 by a compression spring 35 having one end thereof disposed in the cupped end 36 of the valve element 33. The other end of the compression spring 35 is capped by a cap element 37 reciprocatingly mounted in the bore 39 of a valve chamber closing nut 38 which is threaded in fluid sealed relationship in the counterbore 28. A gasket 40 between the mounting element 13 and the valve chamber closing nut 38 insures a fluid tight seal therebetween.

The valve chamber closing nut 38 is provided with a threaded bore at 41 to accommodate a valve adjusting screw 43. The valve chamber closing nut 38 has an outer central stem 44 over which a sealing cap 45 is threaded, the said stem 44 being bored at 440 to provide a chamber for the outer end of the adjusting screw 43. A gasket 46 is disposed between the sealing cap 45 and the valve chamber closing nut 38 to prevent leakage therefrom.

Turning of the valve adjusting screw 43 adjusts the compressive strength of the valve spring 35 and establishes the pressure at which oil pumped to the nozzle 12 will cause the pressure regulating valve 14 to open. Accordingly, when the pump P is started, oil pressure is immediately built up in the fuel supply at the nozzle 12 and at the pressure regulating valve 14, and, when the desired predetermined nozzle pressure is attained, the regulating valve 14 opens and permits fuel oil in excess of that being discharged through the nozzle 12 to return to the tank or reservoir R. Therefore, except for the few seconds required for the pump P to establish the pressure at which the regulating valve 14 is set, there is always an active and substantial flow of oil through the nozzle holder 17 at the pressure selected to be the best for attaining the desired nozzle spray pattern.

The nozzle holder 17 is of major importance in the successful and substantially service-free operation of circulating type oil burners embodying the invention. The nozzle holder 17 preferably has a body member 50 having at its inner end two laterally spaced threaded bores 51 and 52 therein which accommodate the oil supply tube 15 and oil return tube 16 respectively. At the outer end of the body member 50 is a central bore 53 communicating with the bores 51 and 52 which serves as a fuel supply and flushing chamber. A nozzle receiving cap element 54 is threaded into the outer end of the body member 50. The inner wall 500 of the nozzle holder body 50 defines the inner end of the fuel supply and flushing chamber 53 while the inner face 540 of the nozzle receiving cap element 54 defines the outer end thereof. A suitable nozzle 12 is threaded into the nozzle cap receiving element 54 as shown in Fig. 2, which nozzle 12 preferably is a conventional oil burner nozzle carrying its own fine mesh strainer screen 120 having a solid cap 121.

During the operation of a circulating type oil burner incorporating an improved self-cleaning and self-cooling nozzle holder 17 embodying the invention, fuel oil is pumped under pressure through the fuel supply and flushing chamber 53 of the nozzle holder 17 in much greater quantities than the fuel oil passing through the nozzle aperture 122, for example, 10 or 20 or 30 times the amount of fuel sprayed from the nozzle 12. Within the strainer screen 120 and between the strainer screen 120 and the nozzle aperture 122 is a continually changing but relatively quiet pool of fuel oil being constantly forced out of the nozzle aperture 122 by fluid pressure within the nozzle holder 17 acting through the strainer screen 120. As fuel oil passes through the strainer screen 120 to the nozzle aperture 122, foreign particles in the fuel oil which could not pass through the nozzle aperture 122 are retained on the strainer screen 120 momentarily, however, the particles momentarily retained on the strainer screen 120 are immediately flushed therefrom by the turbulence and cleansing action of the excess fuel oil which passes through the fuel supply and flushing chamber 53 to and through the pressure regulating valve 14 to the reservoir or fuel oil tank R. The foreign particles returned to the reservoir R eventually settle to the bottom thereof in a clean-out sump which may be provided for that purpose.

Fig. 3 discloses a nozzle holder 170 constructed somewhat differently than the nozzle holder 17. The nozzle holder 170 is usable when a nozzle 18 which does not carry its own strainer screen is employed. The nozzle holder 170 has a body member 60 with two laterally spaced and threaded bores 61 and 62 therein which accommodate the oil supply tube 15 and oil return tube 16 respectively. At the outer end of the body member 60 is a central bore 63 communicating with the bores 61 and 62 which serves as a fuel supply and flushing chamber. A nozzle receiving cap element 64 is threaded into the outer end of the body member 69, and a disc type fine mesh strainer screen 70 is positioned against the inner annular face 640 of the nozzle receiving cap element 64. The inner wall 600 of the nozzle holder body 60 defines the inner end of the fuel supply and flushing chamber 63 while the disc type strainer screen 70 defines the outer end thereof. A suitable nozzle 18 is threaded into the nozzle cap receiving element 64 as shown in the drawing, which nozzle 18 preferably is a conventional oil burner nozzle of the type which does not incorporate a strainer screen as a part thereof.

During the operation of a circulating type oil burner incorporating an improved self-cleaning and self-cooling nozzle holder 170 embodying the invention, a much larger amount of fuel oil than can possibly pass through the nozzle aperture 180 is pumped under pressure through the flushing chamber 63 of the nozzle holder 170. In the space 71 between the strainer screen 70 and the nozzle aperture 180 is a continually changing but relatively quiet pool of fuel oil constantly being forced out of the nozzle aperture 180 by fluid pressure within the nozzle holder 170 acting through the strainer screen 70. As fuel oil passes through the strainer screen 70 to the nozzle aperture 180, foreign particles in the fuel oil which could not pass through the nozzle aperture 180 are retained on the strainer screen 70 momentarily. However, the turbulence and cleansing action of the excess fuel oil passing through the fuel supply and flushing chamber 63 picks up the particles of foreign matter from the screen 70 and carries them through the pressure regulating valve 14 to the reservoir or fuel tank R.

Although but a single embodiment of the invention and one modification thereof have been shown and described in detail, it is obvious that many changes may be made in the size, shape, detail and arrangement of the various elements of the invention as defined by the appended claims.

We claim:

1. In an oil burner including a source of fuel oil, a nozzle holder and means for freely circulating fuel oil under pressure from said source through said nozzle holder in quantities greatly in excess of the amount to be burned, said nozzle holder comprising a housing having therein a substantial fuel supply and flushing chamber and fuel circulating inlet and outlet passages communicating between said fuel source and said chamber, a nozzle element extending from said housing having its nozzle aperture in communication with said flushing chamber opposite said oil inlet and outlet passages, and a strainer screen element between said nozzle aperture and said chamber disposed in the path of fuel oil circulating through said chamber, said nozzle holder and strainer screen being arranged to provide a relatively quiet pressurized pool of fuel oil between the strainer screen and the nozzle aperture, said strainer screen being freely accessible continually cleaned by said excess fuel oil passing through said nozzle holder, and valve means in the outlet passage disposed remotely from and independent of said fuel supply and flushing chamber establishing and maintaining the desired nozzle pressure.

2. In an oil burner nozzle assembly including a nozzle element having a nozzle aperture therethrough for use in circulating type oil burners wherein a pump supplies fuel oil in quantities greatly in excess of the amount to be burned from a reservoir to and through the nozzle assembly and wherein the excess fuel oil not sprayed from the nozzle is returned to said reservoir comprising a mounting element and a nozzle holder having a substantial fuel circulating chamber therein of a size to permit a large quantity of fuel oil to circulate freely therethrough, said nozzle holder mounting said nozzle element in communication with said fuel circulating chamber, said nozzle being capable of spraying a relatively small fraction of the fuel circulating through said fuel circulating chamber, a strainer screen disposed in said fuel circulating chamber in a manner to provide a relatively quiet pool of fuel oil between

said circulating chamber and said nozzle aperture, and means located separate from and independent of said nozzle assembly establishing and maintaining the desired nozzle pressure in said fuel circulating chamber, all of said fuel oil except the relatively small amount passing through said nozzle being in free circulation in respect to said strainer screen, all of said fuel oil except the relatively small amount thereof passing through said nozzle being in free circulation within said circulating chamber.



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