

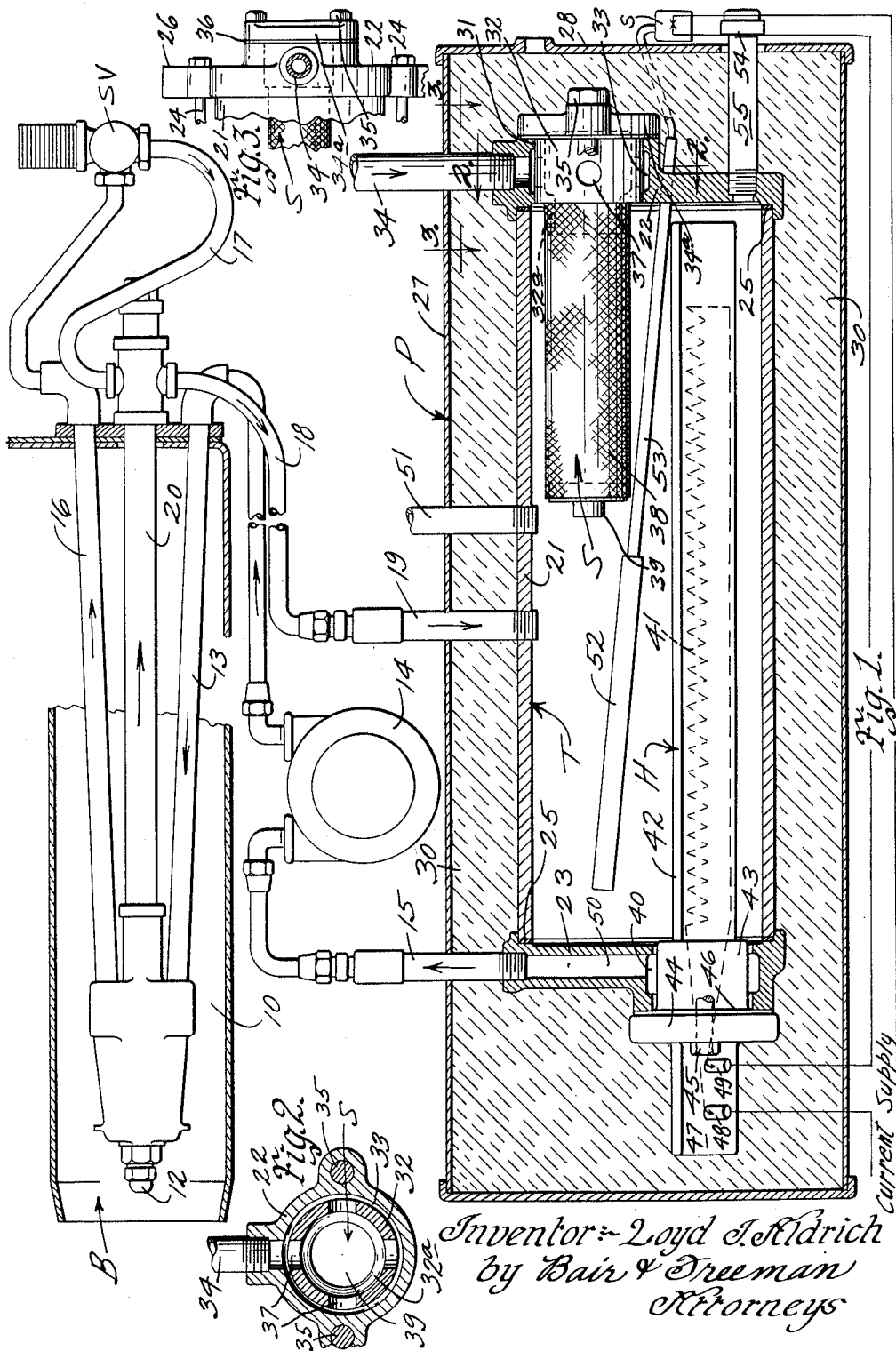
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FUEL PREHEATER

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FUEL PREHEATER

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5 Claims. (Cl. 158—36)

My present invention relates to a preheater for fuel oil for use in connection with an oil burner system particularly adapted for efficiently burning heavy gravity fuel oil, such as commonly known on the market as No. 4 or No. 5 oil, the present application being a division of my copending application Serial No. 254,197, filed February 2, 1939, now Patent No. 2,263,833.

One object of my invention is to preheat heavy fuel oil to a temperature adjacent the flash point thereof so that its viscosity is changed to the neighborhood of ordinary light oils now used for conventional high pressure burners, the preheater illustrated being simple and inexpensive to manufacture and including a strainer having an easy cleaning feature.

A further object is to provide a preheater wherein the strainer is located with respect to the heating means so that the incoming oil is thereby heated and thus flows more readily through the interstices of the fuel strainer.

A further object is to provide a fuel strainer in the form of a foraminous cylinder, open at one end and closed at the other end, the cylinder being removably positioned with respect to a wall of a preheater tank and so associated with an inlet pipe that the incoming fuel oil is deposited inside the foraminous cylinder so that when the strainer is removed all of the foreign material is removed with it, and may then be readily cleaned therefrom.

Still a further object is to provide control means which effects maintenance of the oil in the preheater at a substantially uniform temperature, there being provided a control switch responsive to the temperature of the oil in the preheater for automatically controlling an electric heating unit in the preheater tank.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawing, in which:

Figure 1 is a sectional view through a fuel oil preheater embodying my invention and showing it connected with an oil burner system of the kind shown in my previously referred to copending application.

Figure 2 is a sectional view on the line 2—2 of Figure 1, showing the connection of a fuel inlet to a strainer means; and

Figure 3 is a sectional view on the line 3—3 of Figure 1 showing on a reduced scale a partial plan

view of one end of the preheater and a fuel strainer associated therewith.

On the accompanying drawing I have used the reference character B to indicate generally a burner mechanism, and P a preheater for the fuel oil supplied thereto. The burner B is of the "gun" type shown in my copending application, having a blast tube 10 to which air is supplied and a nozzle 12 from which atomized oil is discharged. The oil is supplied to the nozzle 12 through a pipe 13 connected with an oil pump 14 receiving oil from an outlet pipe 14 of the preheater P. A starting by-pass pipe 16 by-passes the heated oil from the preheater through a solenoid valve SV and return lines 17 and 18 to a return nipple 19 of the preheater B. Also, oil is normally returned through a pipe 20 to the pipe 18 as the pump 14 pumps oil in excess of that required by the nozzle 12.

Since the burner and its operation do not form any part of my present invention, I believe the foregoing description is sufficient to indicate the type of installation used with my preheater P. Reference is made to my copending application for the full details of the burner B and its operation.

My preheater P includes an oil tank T, consisting of a cylindrical wall 21 and end walls 22 and 23 retained in position by tie rods 24 with suitable gaskets 25 interposed between the heads and the cylinder 21. The heads 22 and 23 are provided with extensions 26 (preferably three or four for each head) and an outer cylindrical casing 27 surrounds the tank T and engages the extensions. The outer casing 27 has end plates 28 and 29, and between the outer casing and the tank T heat insulating material 30 is provided to prevent dissipation of heat from the tank T and thereby cause operation of the structure of the preheater at maximum efficiency.

The head 22 is provided with a bore 31 adapted to receive a strainer S including a sleeve-like element 32 received in the bore 31. The bore 31 has an enlarged annular groove 33 adapted to receive oil from a supply pipe 34 which is preferably fed by gravity from a storage tank (not shown). The element 32 terminates in a flange 34a secured to the tank head 22 by cap screws or the like 35, with a suitable gasket 36 interposed between the head and the flange. The element 32 is provided with a plurality of openings 37 through which the oil flows to the interior of a tubular screen 38. The inner end of the screen is closed by a plug 39.

The tank head 23 is provided with a bore 40 adapted to receive a heating unit H. The unit H

is preferably of the electrical type including a resistance element shown diagrammatically at 41 encased in a metal sheath 42. The sheath 42 is secured to a hub 43 which terminates in a flange 44 adapted to be secured to the head 23 by cap screws or the like 45, with a suitable gasket 46 interposed between the flange and the head. A terminal support 47 has terminals 48 and 49 for the heating element 41. The outlet pipe 15 communicates with the bore 40 by a passageway 50. It will be noted that the hub 43 is of such size relative to the bore 40 that oil from the tank T must pass over the heater H upon leaving the tank and flowing to the pump 14.

Connected with the top of the tank T is a vent pipe 51 which extends preferably back to the top of the storage tank so that any air trapped in the preheater P may be allowed to escape. Within the tank T I provide a capillary bulb 52 and a capillary tube 53 connecting it with a control switch S'. The switch S', as described, is responsive to the temperature of the oil in the tank T.

Practical operation

In the operation of my preheater, No. 4 or No. 5 oil is extremely heavy and at room temperature cannot be passed through a fine screen, nor can it be properly atomized nor pumped through small copper tubes with any degree of assurance that it will flow uniformly. I accordingly have the switch S' set for operation at a relatively high temperature (190° or 200°). I have found that this is satisfactory for an oil that has a flash point of 235° as it reduces the oil to the desired viscosity for efficient atomization at the nozzle tip, and the consistency of the oil is then such that it will pass through a very fine screen (120-mesh). Such a screen will effectively strain out all impurities and will require cleaning out not more than once or twice a season with the usual run of oil.

When the heater H brings the temperature of the oil in the tank T up to the point where the switch S' cuts out, there will be a discontinuance of the heat in the heater H, and the switch will thereafter operate to maintain the temperature of the oil in the preheater substantially constant, cutting in when the temperature recedes below the setting of the switch and cutting out when it exceeds the temperature at which the switch is set.

When a burner operation occurs, the preheated oil is first pumped to the nozzle 12, but not through it. Such oil then passes back through the pipes 16—17—18—19 to the tank T, the valve SV being open at that time. After a time period, determined by the length of time it takes for the oil passages to become thoroughly heated, the solenoid valve SV closes, and pressure is built up back of the nozzle 12 to a predetermined degree, which opens the nozzle and permits the oil to be atomized therethrough. The excess oil, however, is by-passed back through 20—18—19 to the tank T, and thus by having the pump 14 supply more oil than required by the nozzle 12, the preheated oil is continuously circulated to keep the temperature of the oil passageways at the desired point for efficient operation in connection with heavy oil.

The preheater also heats the oil so that it can be efficiently strained through a fine screen, which contributes materially to the effective operation of an oil burner of the kind herein disclosed when burning high gravity oil. Recently, there has

been a movement toward the removal of lighter grades of oil from the market as a fuel for oil burners, as these lighter grades can be cracked for gasoline. My system makes possible the use of very heavy oil that is unsuitable for cracking processes, and utilizes the effective preheating of the oil and a subsequent utilization of the preheated oil in such manner that nothing but thin viscosity oil is sprayed from the nozzle, thus increasing the efficiency of combustion and diminishes the possibility of formation of carbon. Furthermore, my preheater conditions the oil so that it can be finely atomized at relatively high pressures (100 or 175 pounds per square inch), and I am able to secure greater heating from a given quantity of oil as heavy gravity oil is capable of delivering more B. t. u.'s than lighter oils.

The strainer S being located adjacent the heater H, and preferably just above it, insures that the strainer will be well heated at all times, so that the incoming oil is also heated and may thereby pass readily through a fine mesh strainer. The strainer arrangement is also such that the oil is delivered to the interior thereof, and, accordingly, any sediment or foreign matter strained from the oil is contained within the strainer. Thus, when the strainer is removed by removal of the end member 28 of the preheater, the insulation in front of the flange 34* and the cap screws 35, the strainer S may then be removed and the sediment will remain in it. The sediment can then be readily washed out through the openings 37, and the strainer replaced. Cleaning the strainer is therefore a comparatively simple operation, and there is assurance that none of the sediment will be left in the tank T, nor will it fall into the tank as the strainer is removed.

The tank may be drained when desired by removing a cap 54 from a drain pipe 55.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure, or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. A fuel preheater for use in an oil burner system having a nozzle and means for pumping oil from said preheater to said nozzle, said preheater having an inlet, heating means in said preheater for maintaining the fuel therein at a substantially constant predetermined temperature, said preheater including a strainer adjacent said heating means and thereby also maintained at said substantially predetermined temperature, said strainer being located between said heating means and said inlet to receive incoming fresh oil before it is heated, said strainer including a foraminous cylinder closed at one end and open at its other end, said other end receiving the fuel whereby sediment and the like in the fuel is deposited inside of the foraminous cylinder, and means for removing said foraminous cylinder from said preheater to remove such sediment therefrom.

2. An oil preheater for an oil burner comprising a tank, heating means in said tank along the bottom thereof, an oil inlet to one end of said tank, a pocket-like strainer removably positioned in said tank adjacent said oil inlet and arranged relative thereto for reception of oil into the interior of the strainer from the oil inlet, said tank having an outlet at the opposite end thereof from

which oil may be pumped from said preheater to the oil burner.

3. A fuel oil preheater comprising a tank, a shell surrounding said tank, insulating material between said tank and said shell, a strainer removably positioned in one wall of said tank, said strainer having an open end and a closed end, said wall of said tank having an inlet communicating with said open end whereby sediment from the oil is deposited inside of the strainer and may be removed with the strainer from the tank, heating means in said preheater having a portion positioned adjacent said strainer to heat the fuel oil flowing thereinto said tank having an outlet and said heating means having another portion located in the line of oil flow from said strainer to said outlet.

4. In an oil preheater, a tank, heating means therein having end portions and a center portion, and a pocket-like strainer therein and located in the zone of heat from one of said end portions, an oil inlet to the interior of said strainer, said tank having an outlet adjacent the other

of said end portions, a pump for pumping oil from said outlet, said center portion being in the path of the oil from said strainer to said outlet, and a nozzle receiving oil from said pump.

5. A fuel tank for use in an oil burner system having a nozzle and means for pumping oil from said tank to said nozzle, said tank having an inlet, an outlet and a return inlet from the pumping means, a strainer in said tank to receive incoming fresh oil, said strainer including a foraminous cylinder closed at one end and open to said inlet at its other end, said other end receiving the fuel whereby sediment and the like in the fuel is deposited inside of the foraminous cylinder, means for removing said foraminous cylinder from said tank to clean such sediment therefrom and heating means in said tank and located in the oil path from said strainer to said outlet, said return inlet returning oil into said path adjacent said strainer whereby the return oil is reheated by a portion of the heating means between said strainer and said outlet.

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