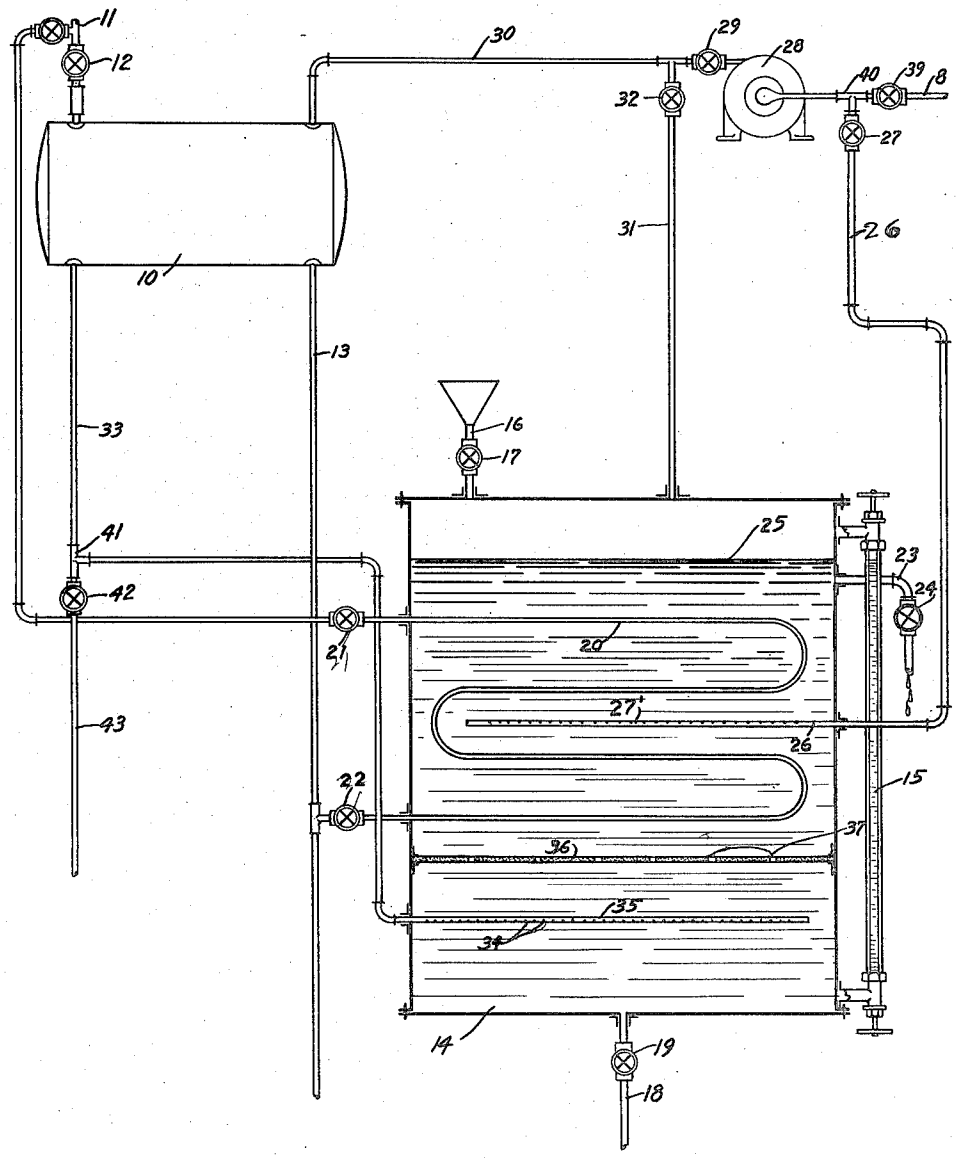
Nov. 3, 1936. J. E. HAMILTON 2,059,231

DEVICE FOR CLEANING FUEL OIL HEATERS

Filed April 30, 1935



INVENTOR
JAMES E. HAMILTON
BY John J. Fitzgerald
ATTORNEY

Patented Nov. 3, 1936 2,059,231

UNITED STATES PATENT OFFICE

2,059,231

DEVICE FOR CLEANING FUEL OIL HEATERS

James E. Hamilton, United States Navy

Application April 30, 1935, Serial No. 18,997

9 Claims. (Cl. 257—1)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to a device for cleaning fuel oil heaters and has for an object to provide a fuel oil heating equipment which may be either permanently installed in connection with a particular fuel oil system or may be provided as portable equipment which can be installed and used when needed.

Fuel oil heaters soon become clogged with sludge and sediment when in use, which settle out of the oil as it is being heated. This sludge and sediment generally collects along the inner walls of the heater and acts as undesirable insulator, greatly cutting down the efficiency of the heater for the purpose intended. This invention serves to quickly and easily remove this objectionable sludge and sediment from the heater and restore it to condition suitable for most efficient use.

The device of this invention is intended to be connected up either temporarily or permanently to the fuel oil heater which it is intended to clean. The device of this invention is so equipped that the solvent used may be either in a liquid or vapor state, as is desired, the equipment being capable of vaporizing the solvent that is intended to be used in the vapor state and of circulating the solvent if used in a liquid state.

With the foregoing and other objects in view, as will hereinafter become apparent, this invention comprises the constructions, combinations, and arrangement of parts hereinafter disclosed, claimed and illustrated on the accompanying drawing herein, wherein

The figure is a schematic line drawing of the invention in operative position.

There is shown at 10 a fuel oil heater which is intended to be cleaned by this invention. This fuel oil heater 10 has the usual steam inlet pipe 11 with a hand control valve 12 and the usual steam exhaust pipe 13 leading from the bottom thereof.

This invention includes a solvent holding tank 14, which is preferably of total capacity of about three times the liquid capacity of the fuel oil heater 10 and of the connections between the fuel oil heater 10 and the solvent tank 14. The tank 14 is provided with a glass level indicating gauge 15 along one side thereof. At the top of the tank there is provided a vent and filling connection 16 which includes a control valve 17. The bottom of the tank 14 is provided with a sludge or sediment drain 18 and control valve 19. A steam coil 20 within the tank 14 is connected through a control valve 21 to the steam pipe 11 and through a control valve 22 to the steam exhaust pipe 13. An overflow pipe 23, with a control valve 24, is located near the top of the tank 14 and serves to control the level of the solvent 25 placed therein through the filling connection 16.

The steam coil 20 which, it will be observed, is located in the upper two-thirds of the tank 14, serves to heat the solvent 25 when desired, either for the purpose of warming the solvent if being used in a liquid state, or for the purpose of vaporizing the solvent if being used in a vapor state. A suction line 26 located substantially three-fifths of the vertical height of the tank above the bottom is provided on its upper edge with a series of suction perforations 27', the suction line 26 being connected through a control valve 27, T-joint 40, pump 28 and control valve 29 to a solvent inlet line 30 running to the top of the fuel heater 10.

A vapor line 31 at the top of the tank 14 is connected through a control valve 32 to the solvent inlet line 30. Solvent discharge line 33 is connected to the bottom of the heater 10 and leads through T-joint 41 to solvent return pipe 35, which is located about one-fifth of the vertical distance above the bottom of the tank 14. Downwardly directed perforations 34 extend along the bottom of return pipe 35. A baffle plate 36 separates the solvent return pipe 35 from the steam coil 20 and the solvent suction pipe 26. A sufficient number of perforations 37 are placed in the baffle plate 36 to permit the free flow of the solvent therethrough.

Another pipe 8 connected through a control valve 39 may be connected to the solvent suction pipe 26 by the T-joint 40 and may be used if desired for introducing solvent into the system by suitable operation of the pump 28 and opening of the appropriate control valves. The solvent discharge line 33 is provided by means of a T-joint 41 with a control valve 42 and drain pipe 43 for draining the heater 10 of its contents whenever desired.

In operation the tank 14 will be filled with the solvent. Valves 39, 32, 12, 19 and 42 are closed, and similarly valves 21 and 22 will be closed unless it is desired for any reason to warm up the solvent 25. Valves 27 and 29 are opened and the pump 28 started into operation. This will cause the solvent 25 in the tank 14 to enter pipe 26 and pass through line 30 into the tank 10. If the tank 10 is empty additional solvent may be added either through the filling connection 16 or through the line 8 until the entire system is filled to the desired level, as shown by the gauge 15, the overflow pipe 23 and control valve 24 being

used to control or adjust the level. The pump 28 will then be in operation, circulating the solvent 25 through the perforations 27 and inlet suction pipe 26 to the heater 10 and back through the pipe 33, T-joint 41 and perforations 35 in the solvent return pipe 34.

The solvent returning from the heater 10 will, of course, carry the sludge and sediment therein and tend to drop it in the bottom of the tank 14, being aided therein by the downward direction of the perforations 35 and the presence of the baffle plate 36. While the circulation is continued, the control valve 19 of the sediment or sludge drain 18 will be opened a slight bit and the sludge or sediment allowed to drain therethrough until clean solvent commences to drain therethrough, showing that the system is clean. When the cleaning is thus completed, the pump is stopped, and the control valves are operated so as to empty the heater 10 of the solvent, control valve 42 for instance being used to eliminate the last bit of the solvent from the heater 10. If an inflammable solvent has been used, the heater 10 may be cleaned of the solvent by opening the steam control valve 12 and allowing steam to pass through the tank and out through the pipe 33 and control valve 42 to drain pipe 43.

If the solvent 25 being used is to be used as a vapor, then the solvent 25 will be filled to a level slightly below the top of the tank 14. Control valves 27 and 29 will be closed and valve 32 will be opened. Then control valves 21 and 22 leading from the steam pipe 11 to the steam coil 20 in tank 14 will be opened, permitting the steam to vaporize the solvent 25 at the top of the tank. The vaporized solvent will then pass through pipe 31 and control valve 32 to the line 30 and into the top of heater 10. Partial condensation of the vaporized solvent will take place against the inner walls of the heater 10, collecting the sediment and sludge and carrying it back through pipe 33 to the vapor return pipe 35 and bottom of the tank 14, the control valve 19 being slightly opened until only clean solvent remains within the tank 14, showing that the fuel heater 10 has been thoroughly cleaned. After the vapor solvent has thus been used, steam may be used to clean out the vapor from heater 10 in the manner already described. Furthermore, by appropriate use of the steam control valve 12, steam may likewise be fed into heater 10 to assist the action of the solvent, depending upon the particular solvent used.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes, without the payment of any royalty thereon.

What is claimed is:

1. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater and back to said solvent tank in a liquid state, a baffle plate in said solvent tank located below the middle thereof, said means comprising a suction pipe leading from said tank above said baffle plate to the top of the heater and a solvent return pipe leading from the bottom of said heater to said solvent tank below said baffle.

2. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater and back to said solvent tank in a liquid state, a baffle plate in said solvent tank located below the middle thereof, said means comprising a suction pipe leading from said tank above said baffle plate to the top of the heater; a solvent return pipe leading from the bottom of said heater to said solvent tank below said baffle, and means in one of said pipes for circulatng the solvent therethrough.

3. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater and back to said solvent tank in a liquid state, a baffle plate in said solvent tank located below the middle thereof, said means comprising a suction pipe leading from said tank above said baffle plate to the top of the heater; a solvent return pipe leading from the bottom of said heater to said solvent tank below said baffle, said solvent suction pipe being perforated along its upper surface and said solvent return pipe being perforated along its lower surface.

4. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater and back to said solvent tank in a liquid state, a suction solvent pipe leading from the upper section of said solvent tank, means in said pipe for creating a suction therein, said suction pipe discharging into the top of the heater, a solvent return pipe leading from the bottom of said heater to said solvent tank adjacent the bottom thereof, and baffle means in said solvent tank between said suction solvent pipe and said solvent return pipe.

5. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater and back to said solvent tank in a liquid state, a suction solvent pipe leading from the upper section of said solvent tank, means in said pipe for creating a suction therein, said suction pipe discharging into the top of the heater, a solvent return pipe leading from the bottom of said heater to said solvent tank adjacent the bottom thereof, baffle means in said solvent tank between said suction solvent pipe and said solvent return pipe, and a sludge or sediment discharge pipe leading from the bottom of said solvent tank, said discharge pipe having a control valve therein.

6. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater and back to said solvent tank in a liquid state, a baffle plate in said solvent tank located below the middle thereof, said means comprising a suction pipe leading from said tank above said baffle plate to the top of the heater; a solvent return pipe leading from the bottom of said heater to said solvent tank below said baffle, said solvent suction pipe being perforated along its upper surface and said solvent return pipe being perforated along its lower surface, and a sludge or sediment discharge pipe leading from the bottom of said solvent tank, said discharge pipe having a control valve therein.

7. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater in a vapor state and then back to said solvent tank, said means comprising a vapor line leading from the top of said solvent tank to the top of the heater and a solvent return pipe leading from the bottom of the said heater to the solvent tank, sediment baffle means in said solvent tank between said vapor line and said solvent return pipe, and means for heating the solvent in the solvent tank.

8. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater in

a vapor state and then back to said solvent tank, said means comprising a vapor line leading from the top of said solvent tank to the top of the heater and solvent return pipe leading from the bottom of the said heater to the solvent tank, sediment baffle means in said solvent tank between said vapor line and said solvent return pipe, and means for heating the solvent in the solvent tank, said heating means comprising a steam coil within the upper portion of said solvent tank.

9. A fuel oil heater cleaning device comprising a solvent holding tank, means for circulating the solvent from said solvent tank to the heater in a liquid or a vapor state and then back to said solvent tank, said means comprising a suction pipe leading from said solvent tank slightly below the top thereof, an overflow control pipe in said solvent tank above said suction pipe, suction control means in said suction line for circulating the solvent therethrough, a vapor pipe leading from the top of the solvent tank above the overflow pipe, control means in said vapor line, a line connecting said vapor line and said suction line to the top of the heater, a solvent return pipe leading from the bottom of the heater to the solvent tank adjacent the bottom thereof, said solvent return line having downwardly discharging perforations therein, said suction line within said tank having upwardly extending perforations therein, a baffle plate in said tank between said solvent return and solvent suction lines, a steam coil in said solvent tank above said baffle plate, a vent and filling connection at the top of said solvent tank and a sediment and sludge discharge line at the bottom of said solvent tank.

JAMES E. HAMILTON.