Aug. 21, 1928. 1,681,663

R. FAICKNEY

AUXILIARY FUEL OIL HEATER

Filed Oct. 26. 1922 2 Sheets-Sheet 1

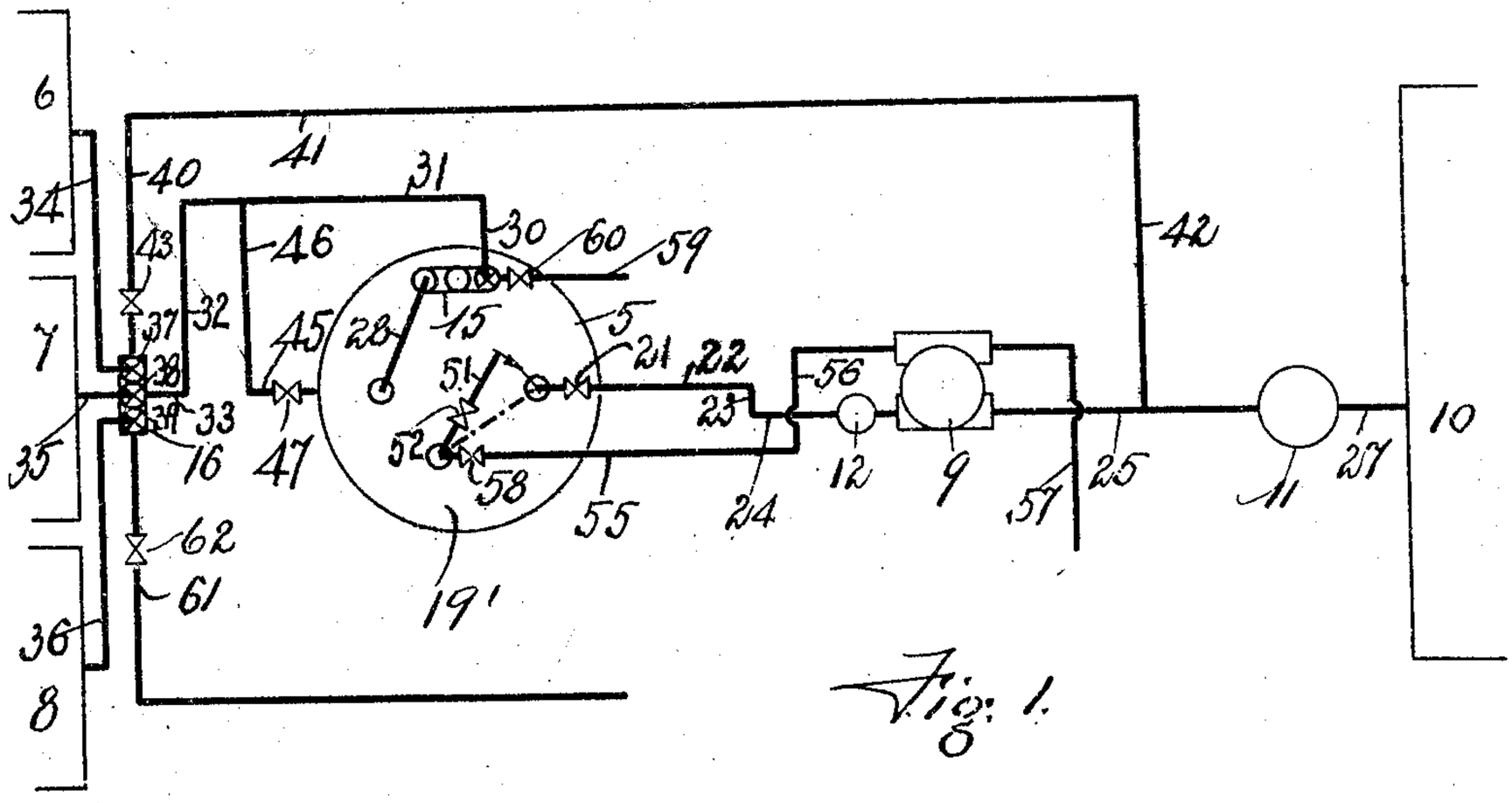


Fig. 1.

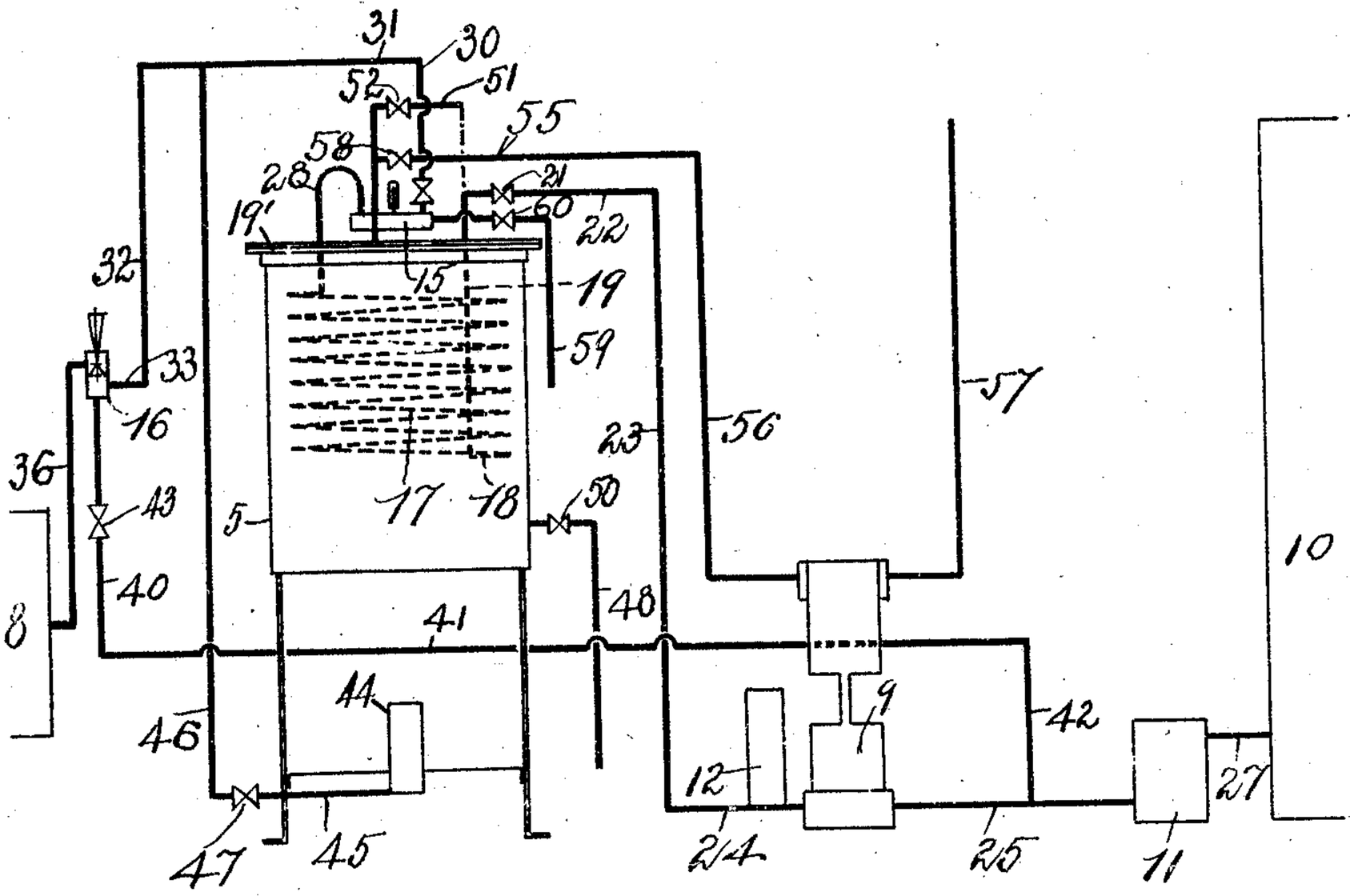


Fig. 2.

Inventor:
Robert Faickney,
by his attorney,
Charles S. Gooding.

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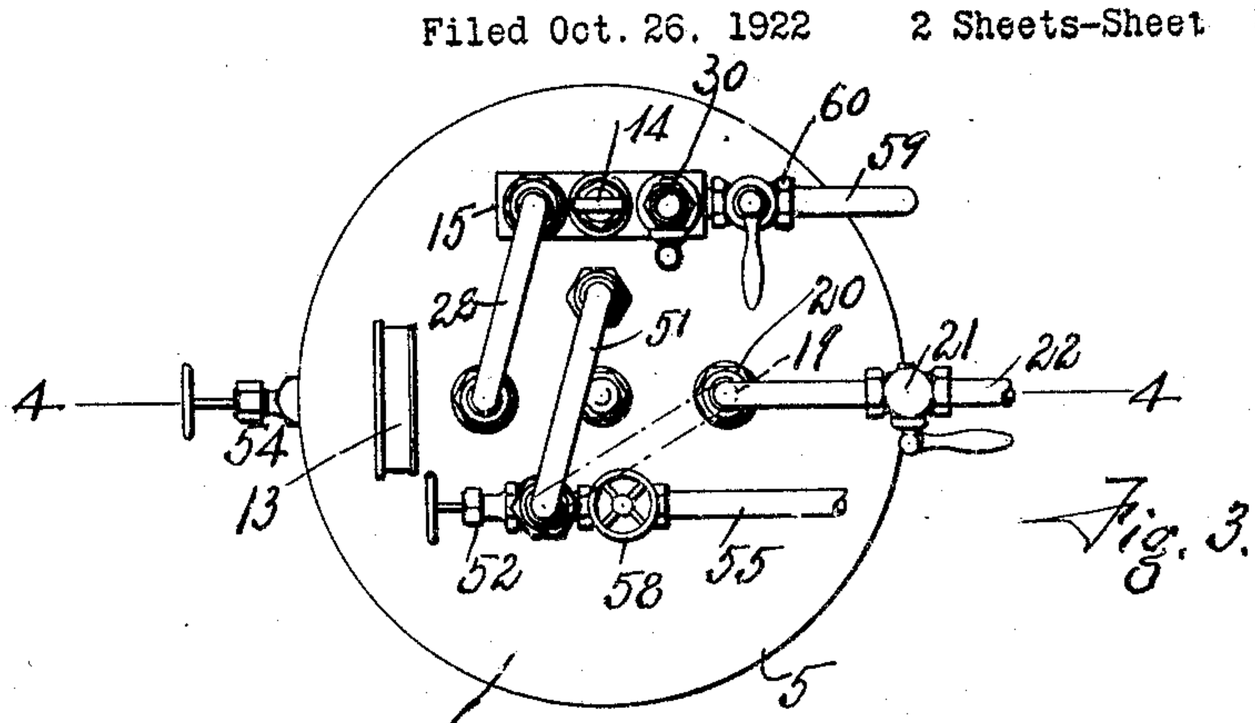


Fig. 3.

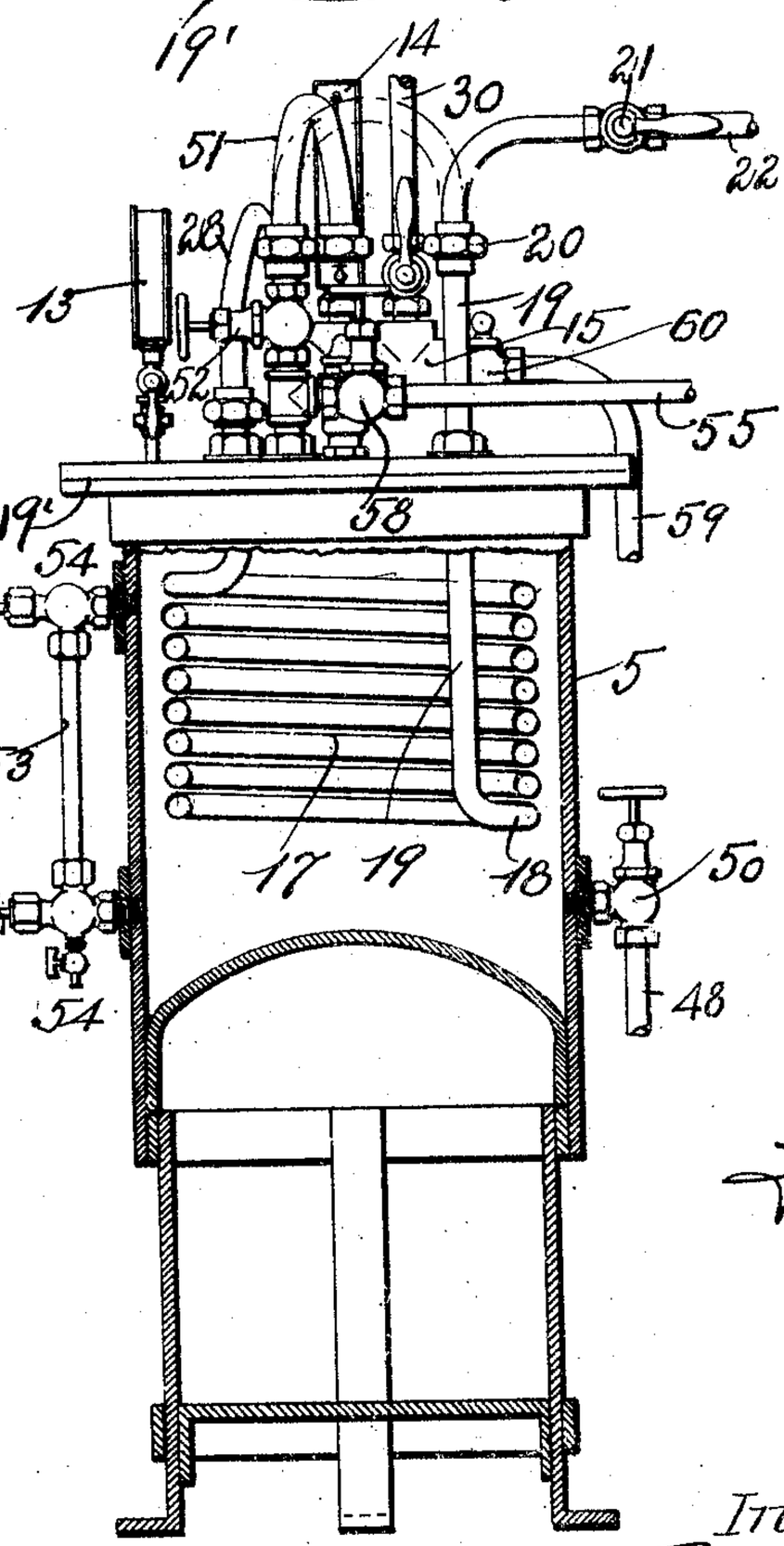


Fig. 4.

Inventor:
Robert Faickney,
by his attorney,
Charles S. Goodwin.

Patented Aug. 21, 1928. 1,681,663

UNITED STATES PATENT OFFICE.

ROBERT FAICKNEY, OF GLASGOW, SCOTLAND, ASSIGNOR TO BETHLEHEM SHIPBUILDING CORPORATION, OF QUINCY, MASSACHUSETTS, A CORPORATION OF DELAWARE.

AUXILIARY FUEL-OIL HEATER.

Application filed October 26, 1922. Serial No. 597,086.

This invention relates to an auxiliary fuel oil heating system, particularly adapted to be used as a system for use on board ship or land for providing means to insure a supply of hot oil to any main steam generator when all conditions are in the state of low temperature and no other suitable means exist for raising the temperature of fuel oil to the necessary degree in order to enable the same to be lighted at a burner beneath the main boiler or to be lighted at burners beneath a plurality of boilers.

The auxiliary fuel oil heating system of this invention contemplates the employment of an auxiliary heater consisting of a small boiler provided with the usual fittings, but containing in the steam and water space a coil or series of coils in which oil is inducted by means of a pump, and which oil on taking up the temperature of the steam and water in which it is immersed, is fed by suitable means, such as a pump, to a main burner, or series of main burners, through manifolds in a condition in which it can be burned.

In first starting up the auxiliary oil heating system the auxiliary heater is heated first by a small hand kerosene or light oil lamp, but after sufficient temperature has been imparted to the fuel oil in the coil and oil line to the burners, the fuel oil itself can be burned under the auxiliary heater providing thereby a constant burner which is kept in use until the starting up of the main boiler has been accomplished at which time the operation of the whole auxiliary heating system is discontinued.

The invention consists in an auxiliary fuel oil heating system such as described in the following specification and particularly as pointed out in the claims.

Referring to the drawings:

Figure 1 is a diagrammatic plan of my improved auxiliary fuel oil heating system.

Fig. 2 is a diagrammatic elevation of the same.

Fig. 3 is a plan view of the auxiliary boiler.

Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 3.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 5 is a small boiler constituting the auxiliary boiler of the system. 6, 7 and 8 are the main burners which are located beneath the main boilers and which operate in a manner well known to those skilled in the art. 9 is an oil pump, 10 is a fuel oil storage tank, 11 is a strainer, 12 is an air vessel, 13 is a steam pressure gauge, 14 is a thermometer, 15 and 16 are manifolds, 17 is a coil through which the oil passes in being heated, the lower or inlet end 18 of the coil terminates in a pipe 19 which extends vertically upward through the interior of the coil and out through the top 19′ of the auxiliary boiler. The pipe 19 is connected by a union 20 to a valve 21 and said valve is connected by pipes 22, 23 and 24 to the oil pump 9. The oil pump 9 is connected by a pipe 25 to the strainer 11 and said strainer is connected by a pipe 27 to the fuel oil storage tank 10. The oil passes out of the upper end of the coil 17 through the top 19′ and into a pipe 28 which leads to the manifold 15 to which the thermometer 14 is fastened. The manifold 15 is connected by pipes 30, 31, 32 and 33 to the manifold 16 which, in turn, is connected by pipes 34, 35, and 36 to the burners 6, 7 and 8 respectively. The pipes 34, 35 and 36 are controlled by valves 37, 38 and 39 respectively. The manifold 16 is connected by pipes 40, 41 and 42 to the pipe 25, these pipes 40, 41 and 42 constituting a recirculating line. A valve 43 is provided in the pipe 40 whereby the recirculation line may be opened or closed. An auxiliary burner 44 is provided for the auxiliary boiler 5 and this auxiliary burner is connected by pipes 45 and 46 to the pipe 31. A valve 47 is provided in the pipe 45 whereby the burner 43 may be connected with or disconnected from the pipe 31. Water is supplied to the auxiliary boiler 5 through the pipe 48 controlled by a valve 50. A branch pipe 51 is connected at one end thereof through the top of the boiler with the steam space of the boiler and this pipe is provided with a valve 52. When desired, the pipe 51 which constitutes an arm, can be swung from the position illustrated in full lines, Figs. 3 and 4, to the position illustrated in dotted lines, and coupled to the upper end of the pipe 19, and then upon opening the valve 52, steam can be blown through the pipe 19, the coil 17 and the pipes and fixtures connected therewith. The boiler 5 is provided with the usual well-known gauge glass 53 and fit-

tings 54. The pump 9 may be operated by steam from the auxiliary boiler 5 conveyed thereto through pipes 55 and 56, the exhaust steam being conveyed away from the pump by a pipe 57, or any other well-known power means may be provided to operate said pump. A valve 58 is provided in the pipe 55 to control the admission of steam to the pump. The manifold 15 is provided with a waste pipe 59 which is provided with a valve 60, and the manifold 16 is provided with a waste pipe 61, controlled by a valve 62.

The general operation of the apparatus hereinbefore specifically described is as follows:—Assuming the entire system to be cold and that it is desired to generate steam in the main boilers, or any of them, the auxiliary boiler 5 has water therein in which a coil 17 is immersed. The coil 17 is supplied with oil from the fuel storage tank 10 by means of the pump 9 which draws the oil from the storage supply tank through the pipe 27, strainer 11 and pipe 25 and forces it through the pipes 24, 23, 22 and 19 to the bottom of the coil 17, this constituting the oil supply. The water in the boiler 5 is at first heated by means of a hand lamp and when the water in the boiler 5 becomes sufficiently heated to produce steam and sufficient pressure and heat to raise the temperature in the coil 17 to about 240°, then the oil in said coil passes from the coil through the pipe 28 to the manifold 15 and from the manifold 15 through pipes 31, 32 and 33 to the manifold 16. From the manifold 16 the oil passes to the burners 6, 7 and 8 under the main boilers, or to any one of them, the passage of oil through the pipes 34, 35 and 36 to the burners 6, 7 and 8 respectively being controlled by the valves 37, 38 and 39 respectively in the manifold 16.

If desired, the oil may be circulated from the coil 17 through the manifolds 15 and 16 and the pipes connected therewith before it arrives at a temperature of 240°, and in such cases if the oil is not sufficiently heated for the purpose of burning freely under the boilers, it is recirculated by closing the valves 37, 38 and 39, opening the valve 43 and allowing the oil to circulate through the pipes 40, 41, 42 and 25 through the pump 9 and from the pump through the pipes 22, 23 and 24 back to the coil 17. This recirculating of the oil may be continued as long as may be desired.

As soon as the water and steam have been sufficiently heated to start the oil in circulation as hereinbefore described, then the hand burner may be replaced by the burner 44 which is suplied with oil through the pipes 45 and 46 from the pipe 31, the oil being turned on to or off from the burner 44 by means of the valve 47. The pump is operated by steam from the auxiliary boiler supplied thereto by pipes 55 and 56 governed by the valve 58.

In addition to using the steam for operating the pump 9 and for heating the oil, the system of piping hereinbefore described including the coil may be blown out by the steam and this is accomplished by swinging the pipe arm 51 from the position illustrated in full lines, Figs. 3 and 4, to that shown in dotted lines in said figures, and by connecting the free end of the pipe arm 51 to the top of the pipe 19 by means of a union, the apparatus is then in condition to have the coil and connecting pipes blown out by steam. To do this the valve 52 is opened and the steam will then pass through the pipe arm 51 into the pipe 19 and thence through the coil 17, driving the oil out of the pipes 22, 23 and 24 and the pump 9 and back through the pipe 25, strainer 11 and pipe 27 into the storage tank. Steam will also drive the oil through the coil 17, pipe 28, manifold 15, pipes 30, 31, 32 and 33 out of the manifold 16 and pipes leading therefrom to the main burners. The steam may be utilized to drive the oil out of the pipes 40, 41 and 42, and, in fact, by means of the steam and the connection 51 from the boiler to the oil piping system the oil can be driven out of the entire oil piping system including the coil, manifolds, pump and strainer.

I claim:

1. In apparatus for heating and supplying oil to main furnace burner the combination of an auxiliary heating chamber, means to introduce water thereinto, means for raising the water to a vaporizing temperature in the auxiliary chamber, an oil container disposed in the upper part of the auxiliary chamber, means to force fuel oil through said container in heat exchanging contact with the water vaporized in the auxiliary chamber, a vapor conduit connecting the auxiliary chamber with the forcing means, whereby the latter may be operated by the steam generated in the auxiliary chamber, and means to conduct the heated fuel oil from the container to the burner.

2. In apparatus for heating and supplying oil to a furnace burner the combination of a heating chamber, means to introduce water thereinto, means for raising the water to a vayorizing temperature, a container disposed in the upper part of the chamber, means to force fuel oil through said container in heat exchanging contact with the water vaporized in the chamber, a conduit connecting the chamber with the forcing means, whereby the latter may be the steam generated in the chamber, means to conduct the heated fuel oil from the container to the burners, and adjustable means for alternatively passing steam from the chamber

through the container to the fuel oil conducting means so that they may be effectively cleaned of oil.

3. In a heating system for steam boilers having oil burners, the combination with burners for the main boilers of an auxiliary boiler, means to feed water thereto, means to heat the water, a coil disposed in the auxiliary boiler, a pump operated by the steam generated in said boiler, conduits connecting the source of fuel oil supply to the pump and the pump to the coil, a conduit to deliver heated oil from the coil to the oil burners, and means associated with the conduit last named and with the pump to effect a recycling of the oil through the coil.

4. An auxiliary fuel oil heating system for steam boilers having, in combination a main boiler, a main burner therefor, an auxiliary boiler, an auxiliary burner for the latter, a coil in said auxiliary boiler, a source of fuel oil supply, a burner for said main boiler, means operated by steam generated in the auxiliary boiler to feed oil from said source of supply through the coil to said main burner and means to connect said auxiliary oil burner to the oil feeding means.

5. An auxiliary fuel oil heating system for steam boilers having, in combination a main boiler, a main burner therefor, an auxiliary boiler, an auxiliary burner for the latter, a coil in said auxiliary boiler, a source of fuel oil supply, a pump operated by steam generated in the auxiliary boiler, connections adapted to feed oil from said source of supply through said coil, and connections from said coil to said main and auxiliary burners whereby oil may be fed from said source of supply to said main and auxiliary burners.

6. In an apparatus for firing a boiler, in combination, a burner for a main steam generator, an auxiliary steam generator, a fluid fuel pump, a steam conduit connected to said generator for supplying steam as motive fluid to said pump, and a fuel supply conduit connecting the outlet of said pump with said burner and having a portion thereof between the pump and the burner passing within said generator.

7. In an apparatus for firing a main boiler, in combination, a burner for the main boiler, an auxiliary steam generator, an oil pump, a steam conduit connected to said generator for supplying steam as motive fluid to said pump, a source of oil supply, a conduit connecting said supply to the inlet of said pump, a conduit passing within said generator connecting the outlet of said pump to said burner, a by-pass connecting the inlet of said pump to the last-mentioned conduit at a point intermediate the burner and the generator, a valve controlling said by-pass, a valve controlling the conduit leading to said burner and a valve for controlling the oil supply.

8. In combination, a boiler, a main burner for heating said boiler, means to supply fuel oil under pressure thereto, said means including an oil supply tank, a filter, a pump, an air chamber, and suitable connections therebetween, a heating chamber, a vapor space in the chamber, a water feed inlet and vapor outlet means in the chamber, a coil disposed in the vapor space, an inlet conduit connecting said coil with the oil supply means, a delivery conduit connecting the former with the burner for the boiler, a valve in the conduit and a valved by-pass connection to recycle oil from the delivery conduit through the vapor space in the chamber until the oil has been heated to the desired temperature for delivery to the main boiler.

9. An auxiliary fuel oil heating system for steam boilers having, in combination, an auxiliary boiler, means to supply water to said auxiliary boiler, means to heat said water, a vertical coil in said auxiliary boiler, the upper and lower terminals of said coil projecting through the top of said boiler, means to force oil through said coil, connections leading into one end of said coil and out of the other end of said coil whereby oil may be fed through said coil and a connection leading out of the top of said boiler and adapted to be attached to the inlet end of said coil whereby oil in said coil may be forced out of the same.

ROBERT FAICKNEY.

CERTIFICATE OF CORRECTION.

Patent No. 1,681,663. Granted August 21, 1928, to

ROBERT FAICKNEY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 101, claim 1, after the word "to" insert the article "a", and line 126, claim 2, after the word "be" insert the words "operated by"; page 3, line 22, claim 4, strike out the words and comma "a burner for said main boiler," and line 24, same page and claim, for the word "said" read "the"; and the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of October, A. D. 1928.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)