Oct. 14, 1952 S. WALD 2,613,653

FUEL SAVING FURNACE

Filed Aug. 20, 1951 2 SHEETS—SHEET 1

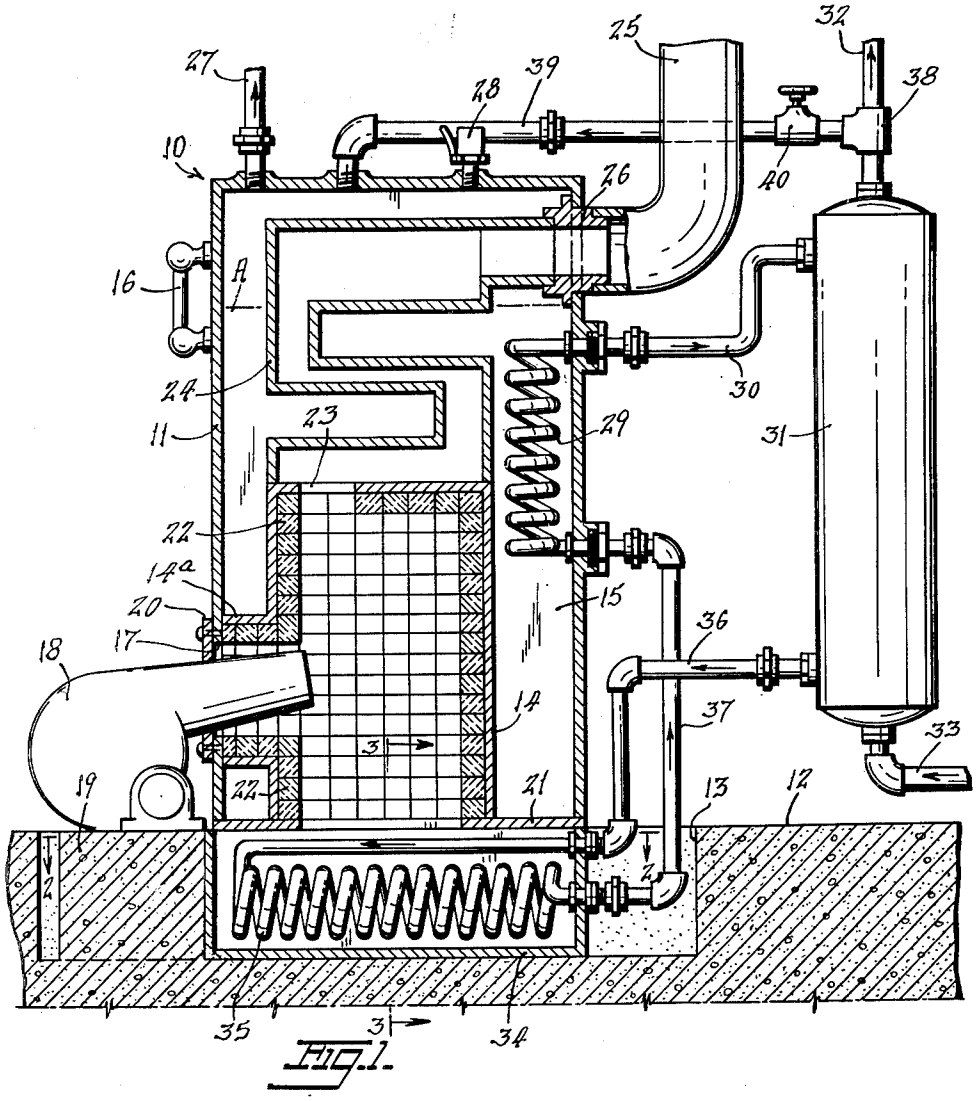


Fig. 1.

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FUEL SAVING FURNACE

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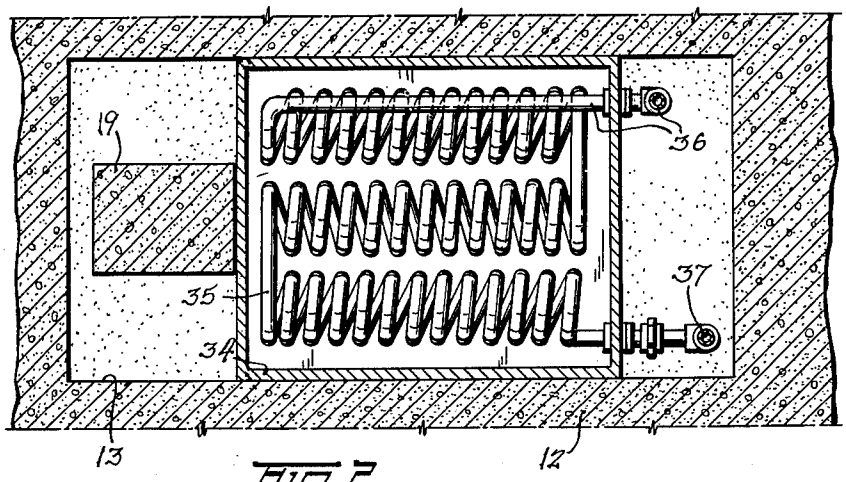


FIG. 2.

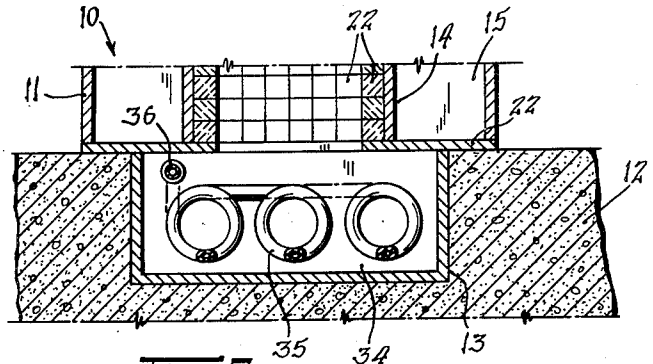


FIG. 3.

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FUEL SAVING FURNACE

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4 Claims. (Cl. 122—20)

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The present invention relates to new and useful improvements in a heating system.

In converting coal burning furnaces of heating systems to be oil or gas fired, the ash pit which remains in the furnace body, as a remnant of the coal burning days, stands idle notwithstanding that considerable heat from the oil or gas burner collects within that ash pit and dissipates with no beneficial result. Such furnaces commonly include a boiler for generating heating steam and within which a coil is situated for heating water for washing, bathing and the like purposes. The present invention proposes mounting a pre-heating coil within the ash pit and within which pre-heating coil the water is pre-heated before being fed into the boiler coil in a manner to employ the heat which collects within the ash pit for a useful purpose.

The heating system in accordance with the present invention includes a boiler within which the hot water is collected until used and it is proposed to connect the pre-heating coil and the boiler coil in series with the storage tank for the hot water in a manner so that cold water entering the tank at the bottom to replace the hot water which is drawn off at the top, will be free to continuously circulate first through the pre-heater coil and then through the boiler coil and the back into the tank as completely heated water.

Another object of the present invention proposes arranging the pre-heating coil within the ash pit in a manner to obtain more hot water in a shorter time with a considerable saving in fuel.

Still further, the present invention proposes an arrangement whereby hot water from the hot water storage tank can be fed directly into the boiler of the heating system to replace the boiled away water in a manner to improve the efficiency of the boiler in supplying steam for heating purposes by shortening the time required for steam generation when the supply of water in the boiler is replenished.

It is a further object of the present invention to provide an improved hot water heating arrangement for a converted furnace boiler which is simple and durable, which is efficient for its intended purposes and which can be constructed and installed at reasonable costs.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

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On the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a diagrammatic view of the heating system of the present invention with the furnace shown in vertical section.

Fig. 2 is a horizontal sectional view taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a partial vertical sectional view taken substantially on the line 3—3 of Fig. 1.

The converted heating system, in accordance with the present invention, includes a furnace 10 having an outer housing 11 rested down on the floor 12 over a conventional ash collecting pit 13. The outer housing 11 of the furnace 10 encloses a centrally located fire box 14 forming a boiler space 15 within the housing 11 and completely surrounding the fire box 14 for containing boiler water. The normal level of the boiler water within the boiler space 15 is indicated in Fig. 1 by the dot and dash lines A. Mounted on the front wall of the housing 11 there is the usual gauge 16 in which the level of the boiler water can be seen. Within the housing 11, the fire box 14 has a forwardly extended throat portion 14a which surrounds a front opening 17 in the front wall of the housing 11 through which coal was passed into the furnace 10 when the same was coal fired. An oil burner 18 has its flame discharging portion extended through the opening 17 and the throat portion 14a so as to discharge its flame into the interior of the fire box 14. The oil burner 18 is mounted on a platform 19 built up within the ash pit 13 and carries a plate 20 bolted to the outer face of the housing 11, see Fig. 1, closing the front opening 17. The plate 20 replaces the usual pivotally mounted furnace door which has been removed.

The bottom of the boiler space 15 is closed by a heavy gauge metal plate 21 which is welded to the bottom edges of the housing 11 and the bottom edges of the fire box 14, see Figs. 1 and 3. The walls of the housing 11 and the fire box 14 are formed of suitably shaped flat plates all welded together and with the material of the throat portion 14a being welded to the inner face of the front wall of the housing 11. All interior surfaces of the fire box 14 and its throat portion are lined with refractory material 22, such as fire brick or the like. The bottom of the fire box 14 opens to the ash pit 13; however, the inner peripheral edges of the plate 21 extend partially inward across the open bottom of the fire box 14 forming a ledge upon which the refractory material 22 is supported, all as best shown in Figs. 1 and 3.

The crown sheet of the fire box 14 and the

refractory material 22 lining the inner face of that crown sheet are formed with an opening 23 for the discharge of combustion gases from the interior of the fire box 14. Mounted within the housing 11 of the furnace 10, there is a heat exchange unit 24 which provides a tortuous path for the exhausted combustion gases from the opening 23 to the flue pipe 25 which rises from the rear of the housing 11. The boiler water within the boiler space 15 circulates about the heat exchange unit 21 and the fire box 14 to be heated thereby to the boiling point to give off steam. Mounted within an opening in the rear of the boiler housing 11, there is a connector member 26 to which the heat exchange unit 24 is connected within the housing and to which the flue pipe 25 is connected exteriorly of the housing.

Extending from the top of the housing 11, there is a steam discharge pipe 27 for conveying steam from the interior of the housing to be used for heating and the like purposes. Also, mounted through the top wall of the housing 11 there is the usual safety valve 28.

Located within the boiler space 15 closely adjacent the top level of the water in that space, there is a water heating coil 29. The coil 29 is provided for heating water to be used for washing, bathing and the like purposes. The discharge end of the heating coil 29 is connected to a pipe 30 for conveying the heated water from the coil to the usual hot water storage tank 31 positioned adjacent the furnace 10. Extending from the top of the tank 31, there is a pipe 32 for conveying the hot water to the points where it is to be used— the kitchen sink, bathroom or the like. A pipe 33 connected at one end to a source of city water has its other end connected to the bottom of the tank 31 so as to replace the hot water which is drawn off the top of the tank. If desired, the pipe 33 can be furnished with a normally open valve for shutting off the supply of city water in cases of emergency—for example, when the tank 31 develops a leak or for other reasons.

Mounted within the ash pit 13 directly below the housing 11 there is an ash collector casing 34 which is open at the front of the furnace for removal of the ashes when the furnace is coal fired. Mounted within that casing 34 there is a pre-heating coil 35 comprised of three adjacent serially connected spirally wound coil sections, as best shown in Figs. 2 and 3. Extending from the bottom of the tank 31 there is a pipe 36 which is extended through the rear wall of the casing 34 and connected at the entrance end of the pre-heating coil 35. Cold water from the bottom of the tank 31 passes through the pipe 36 and then into and through the pre-heating coil 35. Within that coil, the cold water is pre-heated by the heat from the oil burner which passes down into the casing 34 through the open bottom of the fire box 14.

The discharge end of the coil 35 is connected to a discharge pipe 37. The pipe 37 is passed out through the rear of the casing 34, upward along the rear of the housing 11 and is then extended through the rear wall of the housing 11 where it is connected to the entrance end of the coil 29. The pre-heated water then passes through the coil 29 where it is brought to the desired temperature and then discharges through the pipe 30 back into the tank 31. The tank 31, the pipe 36, the pre-heating coil 35, the pipe 37, the coil 29, and the pipe 30 back to the tank 31 form a closed circuit for causing the cold water

to be drawn from the bottom of the tank 31 to be circulated through the coils 35 and 29 to be thoroughly heated and then discharged back into the top of the tank as fully heated water. The utilization of the pre-heating coil 35 within the ash collector casing 34 makes it possible to derive maximum benefit from the heat which is normally dissipated from the casing 34. Thus, the improved system makes it possible to quickly obtain a good supply of hot water with a maximum saving in fuel oil.

Connected in the pipe 32 above the top of the tank 31, there is a T-connector 38 from which a pipe 39 extends. The other end of the pipe 39 discharges into the boiler space 15 through the top wall of the housing 11. Mounted in the pipe 39, there is a normally closed manually operable valve 40. When the valve 40 is opened, hot water from the top of the tank 31 will flow into the top of the boiler space 15 to replace the boiler water which is boiled away by normal use of the furnace 10. Using the hot water from the tank 31 to replace the boiler water makes it possible to more quickly obtain steam from the furnace as the water of the furnace is not chilled as would be the case if cold city water were used for replenishing the supply of boiler water.

In the foregoing description, the features of the present invention are described as applied to a furnace which has been converted to operate as an oil burner which previously operated as a coal furnace. However, it is appreciated that the teachings of the present invention are equally well adapted for application in a heating system converted to operate on gas or any other type of fuel which leaves no residue to collect within the ash collector casing 34 previously used for collecting the ashes which remained from the burned coal.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A heating system comprising a furnace having a fire box surrounded by a spaced housing for containing boiler water, said fire box opening at its bottom, an ashpit below said furnace, a casing mounted within said ashpit, a water heating coil mounted within said spaced housing, a hot water tank positioned along side of said furnace and connected at its bottom end to a source of cold water to be heated and having an exit pipe at its top end for conveying heated water to points where it is to be consumed, a pre-heating coil mounted within said casing below the open bottom of said fire box, a pipe connecting the bottom of said tank to the entrance end of said pre-heating coil, a pipe connecting the discharge end of said pre-heating coil to the entrance end of said first-mentioned coil, and a pipe connecting the exit end of said first-mentioned coil to discharge the heated water back into the top of said tank.

2. A heating system comprising a furnace having a fire box surrounded by a spaced housing for containing boiler water, said fire box opening at its bottom, an ashpit below said furnace, a casing mounted within said ashpit, a water heat-

ing coil mounted within said spaced housing, a hot water tank positioned along side of said furnace and connected at its bottom end to a source of cold water to be heated and having an exit pipe at its top end for conveying heated water to points where it is to be consumed, a pre-heating coil mounted within said casing below the open bottom of said fire box, a pipe connecting the bottom of said tank to the entrance end of said pre-heating coil, a pipe connecting the discharge end of said pre-heating coil to the entrance end of said first-mentioned coil, and a pipe connecting the exit end of said first-mentioned coil to discharge the heated water back into the top of said tank, said pre-heating coil being comprised of three adjacent serially connected spirally wound coil sections.

3. A heating system comprising a furnace having a fire box surrounded by a spaced housing for containing boiler water, said fire box opening at its bottom, an ashpit below said furnace, a casing mounted within said ashpit, a water heating coil mounted within said spaced housing, a hot water tank positioned along side of said furnace and connected at its bottom end to a source of cold water to be heated and having an exit pipe at its top end for conveying heated water to points where it is to be consumed, a pre-heating coil mounted within said casing below the open bottom of said fire box, a pipe connecting the bottom of said tank to the entrance end of said pre-heating coil, a pipe connecting the discharge end of said pre-heating coil to the entrance end of said first-mentioned coil, and a pipe connecting the exit end of said first-mentioned coil to discharge the heated water back into the top of said tank, a T-connector mounted in said exit pipe from said tank, and a pipe connected to said T-connector and having its other end connected to the top of said furnace for conveying heated water from said tank to the space of said furnace for replacing the boiled away boiler water.

4. A heating system comprising a furnace having a fire box surrounded by a spaced housing for containing boiler water, said fire box opening at its bottom, an ashpit below said furnace, a casing mounted within said ashpit, a water heating coil mounted within said spaced housing, a hot water tank positioned along side of said furnace and connected at its bottom end to a source of cold water to be heated and having an exit pipe at its top end for conveying heated water to points where it is to be consumed, a pre-heating coil mounted within said casing below the open bottom of said fire box, a pipe connecting the bottom of said tank to the entrance end of said pre-heating coil, a pipe connecting the discharge end of said pre-heating coil to the entrance end of said first-mentioned coil, and a pipe connecting the exit end of said first-mentioned coil to discharge the heated water back into the top of said tank, a T-connector mounted in said exit pipe from said tank, and a pipe connected to said T-connector and having its other end connected to the top of said furnace for conveying heated water from said tank to the space of said furnace for replacing the boiled away boiler water, and a normally closed manually operable valve mounted in said last-mentioned pipe for controlling the flow of water from said tank into said space of said furnace.

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