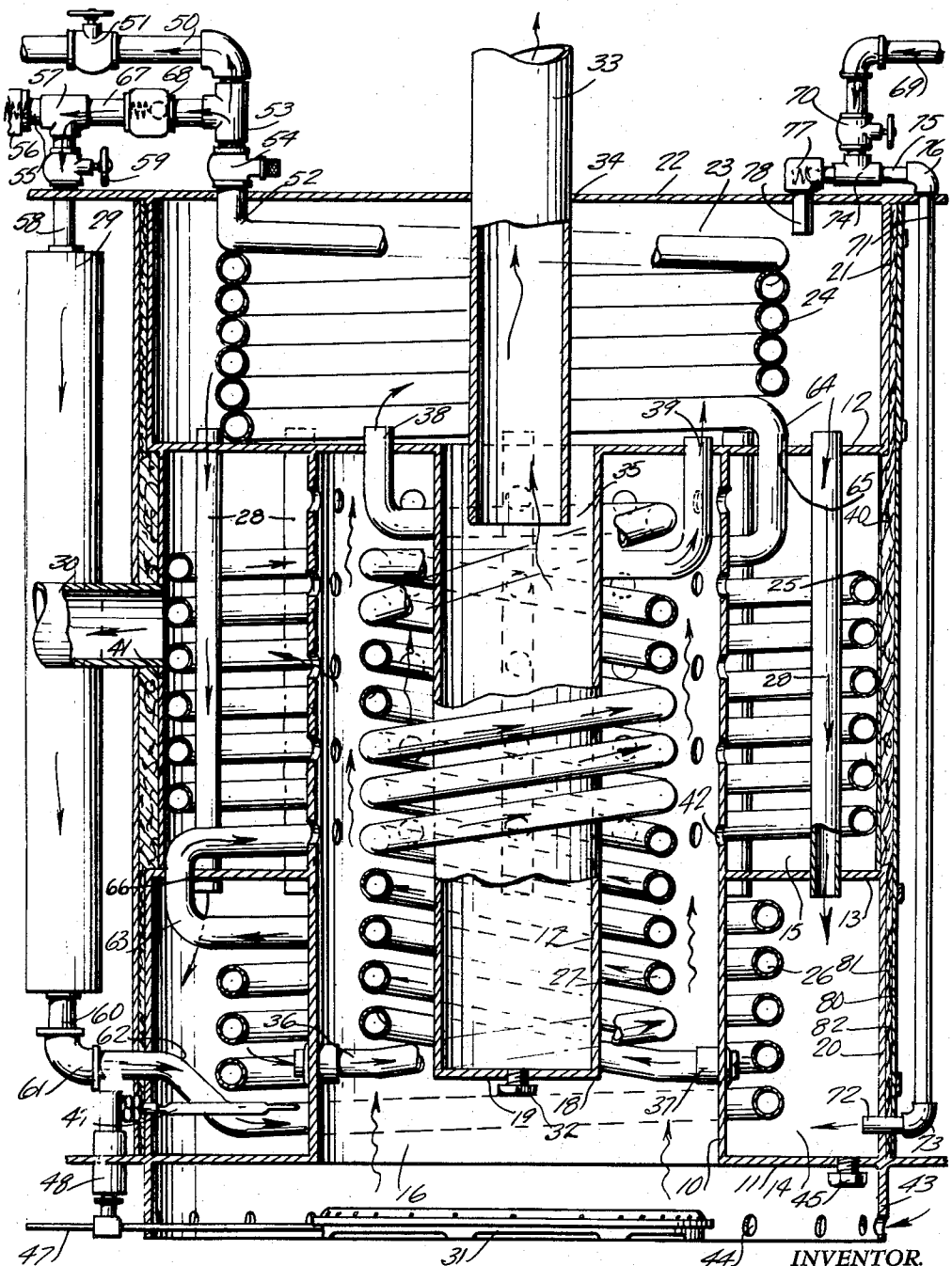
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HEATING AND HOT WATER BOILER

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HEATING AND HOT WATER BOILER

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This invention relates to hot water heating systems, and in particular a boiler having coils for hot water for heating positioned in the firebox or combustion chamber where the water is subjected to direct heat of the fire and also coils for domestic hot water services positioned in the hot water of the boiler and also in an outer portion of the combustion chamber wherein a continuous supply of hot water for domestic use is provided and wherein substantially all heat units are transferred to hot water for heating.

The purpose of this invention is to provide a relatively small boiler wherein the circulation of water therethrough is so arranged that substantially all B.t.u.'s of the fire are utilized.

This invention is an improvement over the boiler of my co-pending application filed March 21, 1957, with the Serial Number 647,516, now Patent No. 2,904,014, in that an open annular chamber is provided around the intermediate part of the boiler which is in communication with the combustion chamber of the boiler through openings in an inner wall thereof, in that a portion of the hot water coil is positioned in the open annular area and in that the upper end of a center coil positioned in the combustion chamber opens into a water compartment in the upper end of the boiler.

Various attempts have been made to increase the efficiency of hot water boilers and particularly boilers for supplying hot water for heating and also hot water for service, however, it has been found difficult to distribute the hot gases of combustion throughout the interior of the boiler whereby substantially all water in the boiler is directly subjected to the hot gases of combustion.

With this thought in mind this invention contemplates a boiler having a cylindrical shell divided into upper and lower water compartments with an open intermediate compartment which is in direct communication with a centrally disposed combustion chamber whereby substantially all coils of the boiler are directly subjected to the hot gases of combustion.

The object of this invention is, therefore, to provide an improved combination boiler for supplying hot water for heating and also hot water for service in which coils connecting different sections of the boiler are positioned directly in the path of hot gases of combustion.

Another object of the invention is to provide a combination boiler for heating and also for providing service water in which a reservoir is provided in the service water assembly so that a substantially inexhaustable supply of hot water for services of a building is provided.

Another object of the invention is to provide a combination hot water heating and service water boiler in which a return connection of the heating system of the boiler is extended to the lower end of the boiler shell, or casing.

A further object of the invention is to provide a combination boiler supplying hot water for heating a building and also for service lines of the building in which the hot water for the service lines is supplied by

a coil extended through the boiler in which a portion of the coil for supplying hot water for service is subjected directly to hot gases of combustion of the boiler.

A still further object of the invention is to provide an efficient combination boiler for supplying hot water for heating and also for service connections of an enclosure in which the boiler is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a boiler having cylindrical upper and lower sections spaced by an intermediate open section with an intermediate cylindrical wall providing a combustion chamber and having openings providing communicating means between the combustion chamber and open area between upper and lower sections of the boiler and a tubular water leg or center casing extended downwardly from the upper section of the boiler to a point spaced from the lower end thereof and suitable coils for carrying water to the upper, lower, and intermediate sections of the boiler.

Other features and advantages of the invention will appear from the following description taken in connection with the drawing, wherein the drawing shows a vertical section through a combination heating and service water boiler with parts broken away and parts shown in elevation.

Referring now to the drawing wherein like reference characters denote corresponding parts the combination boiler for supplying hot water for heating and also for service of this invention includes an intermediate cylindrical casing **10** extended upwardly from a circular base plate **11** to a circular upper plate **12** and having a horizontally disposed ring **13** extended from the intermediate part providing a lower water compartment **14** an intermediate open compartment **15** and an inner combustion chamber **16**, a center casing **17** extended from the inner edge of the upper plate **12** downwardly to a point **18**, at which point the lower end of the center casing **17** is closed by a lower plate **19**, a lower cylindrical wall **20** connecting outer edges of the base plate **11** and intermediate plate **13** and surrounding the lower compartment **14**, an upper cylindrical wall **21** extended from the peripheral edge of the upper plate **12** to a cover plate **22** providing an upper compartment **23** positioned between the upper plate **12** and cover plate **22**, a hot water coil including an upper section **24** positioned in the compartment **23**, an intermediate section **25** positioned in the compartment **15** which is in communication with the combustion chamber **16** and a lower section **26** that is positioned in the lower compartment **14**, a double hot water coil **27** extended around the center casing **17** and positioned with the lower end opening into the lower compartment **14** and the upper end into the upper compartment **23**, a plurality of vertically disposed tubes **28** mounted in the ring **13** and upper plate **12**, extending through the open compartment **15** and providing communicating means between the lower compartment **14** and upper compartment **23**, a reservoir **29** connected in the domestic or service water line, a flue connection **30**, and a burner **31**.

The center casing **17** provides a water leg or center boiler and the lower end is provided with a drain plug **32**. The wall of the center casing is completely closed, depending from the inner edge of the upper plate **12** and a supply connection **33** extending downwardly through an opening **34** in the cover plate **22** extends into the upper end of the center casing, terminating at the point **35** whereby hot water from the upper compartment **23** passes downwardly around the inner surface of the inner casing or tube **17**, passing upwardly through the center of the tube and to radiators or other heat exchangers through the tube **33**.

Lower ends 36 and 37 of the double coil 27 extend through the cylindrical intermediate wall 10, drawing water from the lower compartment 14 and upper ends 38 and 39 of the coils extend through the upper plate 12, opening into the upper compartment 23.

The lower section 20 of the outer wall or housing of the boiler extends from the base plate 11 to the ring 13 and the upper section 21 extends from the upper plate 12 to the cover plate 22, the intermediate section between the ring 13 and upper plate 12 being open and the entire outer surface of the boiler being covered with a layer 40 of asbestos or the like, the layer 40 being covered with a thin sheet of tin or other metal 41 through which the flue 30 extends, the inner end of the flue extending into the intermediate compartment 15 through the layer 40 of asbestos providing a stack connection and the open area 15 communicating with the combustion chamber 16 through spaced openings 42 in the upper part of the intermediate cylinder 10.

The outer housing is also provided with a band 43 extended below the base plate 11 and having spaced openings 44 therein through which air for combustion is supplied to the burner 31. The base plate 11 is also provided with a drain plug 45 to facilitate cleaning the lower section of the boiler.

Oil or other fuel is supplied to the burner 31 through a connection 47 which extends through a control valve 48 which is actuated by a thermostat 49 that may be set to any suitable temperature, desired.

Hot water for services of a building is supplied through a pipe 50 having a valve 51 therein, the pipe 50 being connected to the upper end 52 of the upper section 24 of the hot water coil through a fitting 53 and a check valve 54. Cold water from the city main is supplied to the heating system through a pipe 55 in which a check valve 56 is positioned and the pipe 55 is connected to a fitting 57 in the reservoir 29 by a tube 58 in which a supply control valve 59 is positioned.

The lower end of the reservoir 29 is connected by a tube 60 through a fitting 61 and the connection 62 to the lower end of the section 26 of the hot water coil. The lower section 26 of the hot water coil is connected to the intermediate section 25 by a connection 63 and the upper end of the section 25 is connected to the upper section 24 through a connection 64. The connection 64 extends through an opening 65 in the upper plate 12 and the connection 63 extends through an opening 66 in the ring 13. The upper end of the section 24 is connected to a hot water supply 50 through the end 52 in the fitting 53 and this connection is provided with a cross connection 67 in which a check valve 68 is provided, the connection 67 extending from the fitting 53 to the fitting 57.

The return connection 69 from the hot water heating system is connected through a valve 70 to a tube 71 that is positioned on the outside of the housing of the boiler and the lower end of the tube 71 is provided with a nipple 72 that extends from a fitting 73 through the lower part of the outer wall 20. The connection 69 is also provided with a fitting 74 that is connected by a nipple 75 to a fitting 76 on which the tube 71 extends and the fitting 74 is also provided with a valve 77 from which a nipple 78 extends, the nipple 78 extending through an opening in the upper or cover plate 22 of the housing.

The valve 77 is a check valve preventing return of the system entering the upper end of the boiler.

With the parts designed and assembled as illustrated and described and with the boiler and coils thereof filled with water hot gases of combustion from the burner 31 pass upwardly through the combustion chamber 16, through the openings 42 into the open compartment 15 and from the compartment 15 through the flue 30 to a stack or the like.

Water is supplied to the boiler and system through the return connection 69 as desired.

The intermediate section 25 of the hot water service coil is covered with a band 80 in which the flue connection 30 is mounted, and the flue connection extends from the band 80 which is positioned over the section 25 of the coil. The space 81 between the band 80 and the asbestos covering layer 40 is filled with asbestos 82, in which the intermediate section 25 of the hot water coil is positioned.

It will be understood that modifications, within the scope of the appended claims, may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

1. A boiler comprising an intermediate cylindrical wall having openings in the upper part, an upper circular plate mounted on the upper end of the wall, said upper circular plate having a center opening therein, a center tubular casing depending from the upper plate, the lower end of the center tubular casing being closed, a center coil positioned around the center tubular casing, the lower end of the center coil being extended through the lower end of the intermediate casing, and the upper end extended through the upper plate, a horizontally disposed base plate extended from the lower end of the intermediate wall, an outer cylindrical wall extended upwardly from the base plate, a ring connecting the upper edge of the outer cylindrical wall to the intermediate cylindrical wall, thereby providing an annular lower compartment, an upper outer cylindrical wall extended upwardly from the periphery of the upper plate, a cover plate positioned on and secured to the upper edge of the upper outer cylindrical wall providing an upper hot water compartment that is in fluid communication with the upper end of the center tubular casing, the boiler having an open area positioned between the upper and lower compartments, a service hot water coil extended from the upper part of the upper compartment, through the intermediate or open area and also into the lower compartment, said service hot water supply coil having a supply and a return connection, a return connection extended from the annular lower compartment of the boiler, and a hot water supply connection extended from the center tubular casing through the upper compartment.

2. A combination boiler comprising an upper compartment, a lower compartment, and an intermediate compartment, a service hot water coil extended from the upper compartment, through the intermediate compartment and into the lower compartment, the upper end of the coil having a connection for connecting the coil to a hot water supply connection that extends through the upper compartment, the lower end of the coil being connected to a service water supply line, an inner cylindrical wall extending through the intermediate compartment and forming the inner wall of the lower compartment, a tubular center casing extended from the upper compartment to a point spaced above the lower end of the lower compartment and providing a hot water leg that is in fluid communication with the upper compartment, a coil extended around the center casing, the upper end of the coil opening into the upper compartment and the lower end of the coil opening into the lower compartment, a hot water supply pipe extended from the upper end of the center casing, spaced vertically disposed tubes extended from the lower compartment to the upper compartment, a return connection extended from the lower end of the lower compartment, a layer of asbestos material covering the outer surface of the boiler, a covering of thin sheet metal covering the layer of asbestos, and a flue connection extended from the cover surrounding the asbestos layer, and opening into the intermediate compartment.

3. A combination boiler comprising an upper compartment, a lower compartment, and an open intermediate compartment, a service hot water coil extended from the upper compartment, through the open intermediate com-

partment and into the lower compartment, the upper end of the coil having a connection for connecting the coil to a hot water supply connection, the lower end of the coil being connected to a service water supply line, an inner cylindrical wall extended through the lower and intermediate compartments, a tubular center casing that is open at the top and closed at the bottom extended from the upper compartment to a point spaced above the lower end of the lower compartment and providing a hot water leg that is in fluid communication with the upper compartment, a coil extended around the center casing, the upper end of the coil opening into the upper compartment and the lower end of the coil opening into the lower compartment, a hot water supply pipe extended from the upper end of the center casing through and outwardly of the upper compartment, spaced vertically disposed tubes extended from the lower compartment to the upper compartment, a return connection extended from the lower end of the lower compartment, a layer of asbestos material covering the outer surface of the boiler, a covering of thin sheet metal covering the layer of asbestos, a flue connection extended from the cover surrounding the asbestos layer, and a reservoir between the service water supply and a connection to the lower end of the hot water supply coil.

4. In a combination heating and service water boiler, an intermediate cylindrical casing having spaced openings in the upper part thereof, a center casing, open at the upper end and closed at the lower end positioned coaxial the intermediate casing, a horizontally disposed upper plate connecting upper ends of the center and intermediate casings, and extended beyond the intermediate casing, an upper cylindrical casing extended upwardly from the periphery of the upper plate, a cover plate positioned on the upper end of the upper casing providing an upper compartment that is in fluid communication with said center casing, a base plate upon which the intermediate casing is mounted, an outer cylindrical casing spaced from the intermediate casing and also positioned on the base plate, a ring connecting the upper end of the outer cylindrical casing mounted on the base plate to the intermediate casing providing an annular lower compartment, said intermediate casing, upper plate, and ring providing an intermediate annular open compartment, spaced vertically disposed tubes extended through said open annular compartment with upper ends extended through the upper plate and into the upper compartment and lower ends extended through the ring and into the lower compartment, a double coil extended around the center casing and positioned in the intermediate casing, the lower end of the double coil opening into the lower compartment and the upper end opening into the upper compartment, a service hot water coil positioned with a section thereof in the upper compartment and another section in the open intermediate compartment and a lower section in the lower compartment, said sections being connected through the upper plate and ring, respectively, the lower end of the service hot water coil being connected to a water supply and the upper end being connected to a service hot water system, a return connection extended from the lower portion of the lower compartment of the boiler and a hot water supply tube extended from the upper part of the center casing through the compartment of the boiler.

5. In a combination heating and service water boiler, an intermediate cylindrical casing having spaced openings in the upper part thereof, a center casing, open at the upper end and closed at the lower end positioned in the center of the intermediate casing, a horizontally disposed upper plate connecting upper ends of the center and intermediate casings, and extended beyond the intermediate casing, an upper cylindrical casing extended upwardly from the periphery of the upper plate, a cover plate positioned on the upper end of the upper casing providing an upper compartment that is in fluid communication with said center casing, a base plate upon which the intermediate casing is mounted, an outer cylindrical casing spaced from the intermediate casing and also positioned on the base plate, a ring connecting the upper end of the outer cylindrical casing mounted on the base plate to the intermediate casing providing an annular lower compartment, said intermediate casing, upper plate, and ring providing an intermediate annular open compartment, spaced vertically disposed tubes extended through said open annular compartment with upper ends extended through the upper plate and into the upper compartment and lower ends extended through the ring and into the lower compartment, a double coil extended around the center casing and positioned in the intermediate casing, the lower end of the double coil opening into the lower compartment and the upper end opening into the upper compartment, a service hot water coil positioned with a section thereof in the upper compartment and another section in the open intermediate compartment and a lower section in the lower compartment, the sections being connected through the upper plate and ring, a reservoir positioned on the outside of the boiler, the lower end of the reservoir being connected to the lower end of the section of the service water coil, the upper end of the reservoir being connected to a water supply line, the upper end of the upper section of the service

munication with said center casing, a base plate upon which the intermediate casing is mounted, an outer cylindrical casing spaced from the intermediate casing and also positioned on the base plate, a ring connecting the upper end of the outer cylindrical casing mounted on the base plate to the intermediate casing providing an annular lower compartment, said intermediate casing, upper plate, and ring providing an intermediate annular open compartment, spaced vertically disposed tubes extended through said open annular compartment with upper ends extended through the upper plate and into the upper compartment and lower ends extended through the ring and into the lower compartment, a double coil extended around the center casing and positioned in the intermediate casing, the lower end of the double coil opening into the lower compartment and the upper end opening into the upper compartment, a service hot water coil positioned with a section thereof in the upper compartment and another section in the open intermediate compartment and a lower section in the lower compartment, said sections being connected through the upper plate and ring, respectively, the lower end of the service hot water coil being connected to a water supply and the upper end being connected to a service hot water system, a return connection extended from the lower portion of the lower compartment of the boiler and a hot water supply tube extended from the upper part of the center tube through the upper compartment of the boiler, the outer surface of the boiler being covered with a band of asbestos and the band being covered with a jacket of sheet metal, said jacket having a flue connection extended therefrom.

6. In a heating and service water boiler, the combination which comprises a vertically disposed intermediate cylindrical casing having openings in the upper portion of the wall thereof, a base plate upon which said casing is mounted, an upper plate having a center opening therein mounted on the upper end of the intermediate cylindrical casing, a center tube extended from the inner edge of the opening of the upper plate downwardly to a point spaced upwardly from the lower end of the intermediate cylindrical casing, the lower end of the center tube being closed, a hot water supply tube extended from the upper part of the center tube, an outer cylindrical casing extended upwardly from the periphery of the upper plate, a cover plate positioned on the upper end of the outer cylindrical casing extended from the upper plate providing an upper compartment that is in fluid communication with said center tube, an annular ring extended around the intermediate cylindrical casing and projecting outwardly therefrom, a lower outer cylindrical wall connecting the periphery of the ring to the base plate providing a lower annular compartment, a layer of asbestos extended around the outer surface of the boiler, a thin metal band positioned around the asbestos, a flue connection secured to the band and extended through the asbestos into an inter mediate compartment between the upper plate and ring and on the outside of the intermediate cylindrical casing, spaced vertically disposed tubes extended through the intermediate compartment with upper ends thereof opening into the upper compartment and with lower opening into the lower compartment, a service water coil positioned with an upper section thereof positioned in the upper compartment, an intermediate section thereof in the intermediate compartment and a lower section thereof in the lower compartment, the sections of the coil being connected through the upper plate and ring, a reservoir positioned on the outside of the boiler, the lower end of the reservoir being connected to the lower end of the section of the service water coil, the upper end of the reservoir being connected to a water supply line, the upper end of the upper section of the service

water coil having an outlet connection, a cross connection between the outlet connection of the coil and service water supply connection, a return connection extended from both the upper and lower compartments of the boiler, a burner positioned below the boiler, a fuel supply connection extended from the burner and a thermostat control regulator in said fuel supply connection.

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