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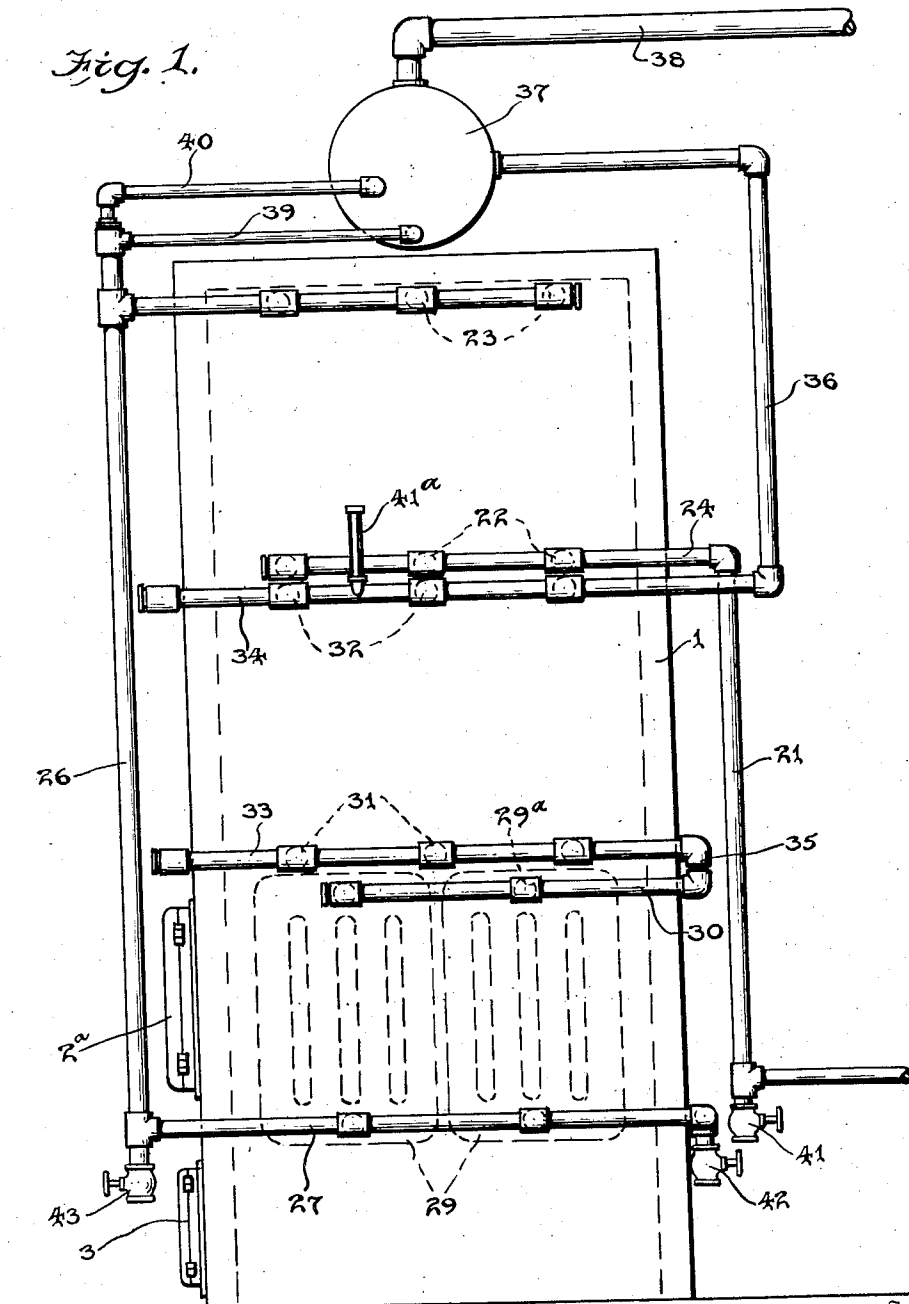
D. CONEKIN

2,043,883

HEATING SYSTEM

Filed March 25, 1935

4 Sheets-Sheet 1



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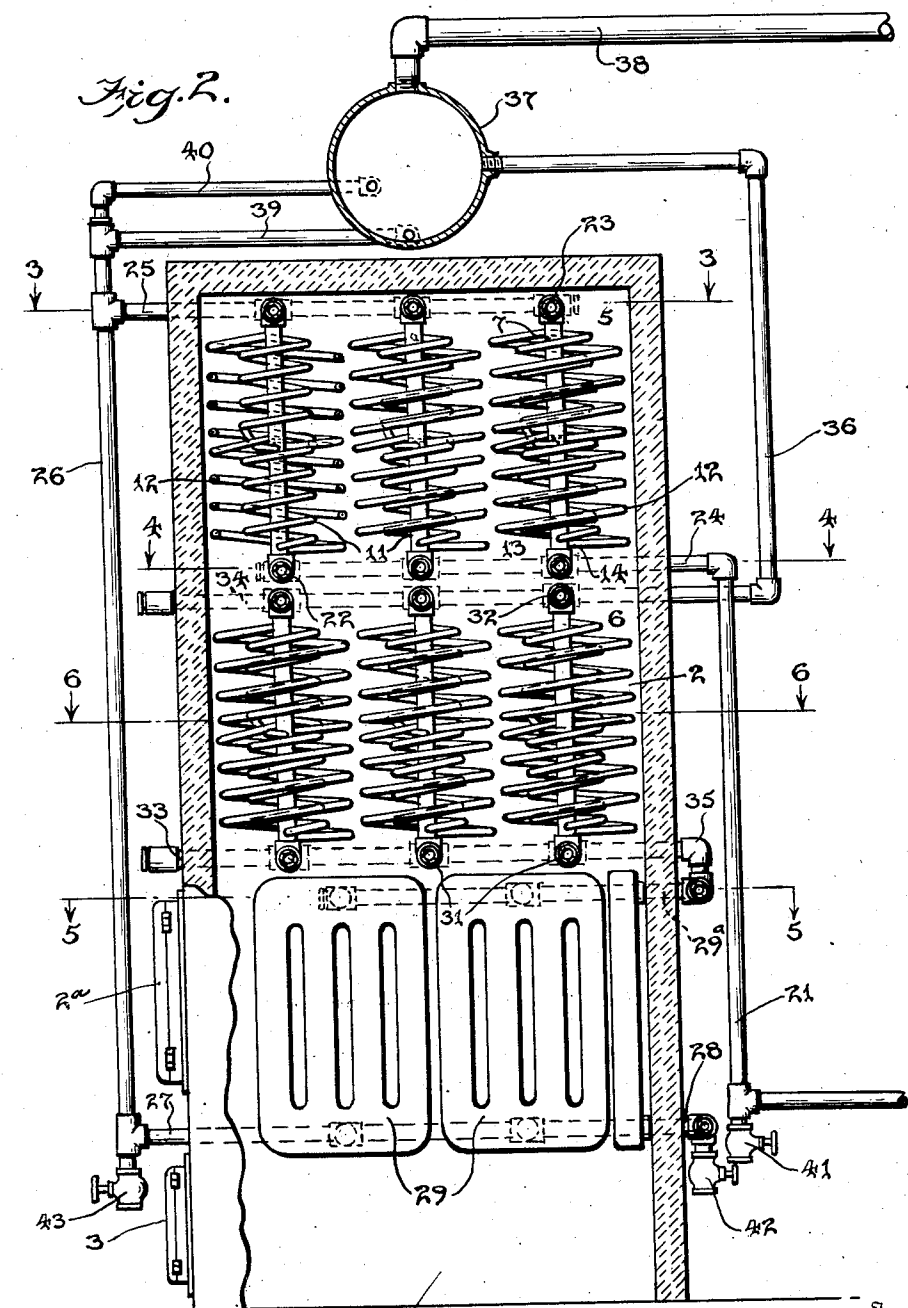
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4 Sheets-Sheet 2



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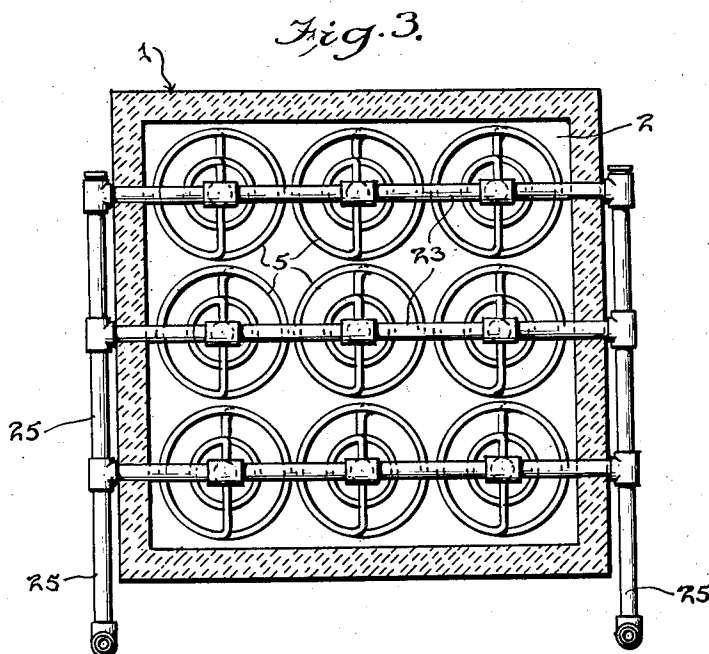
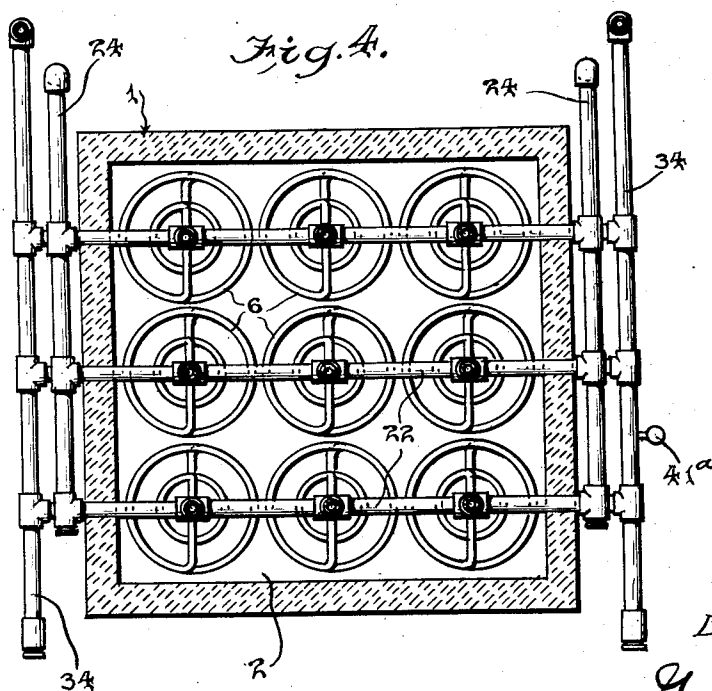
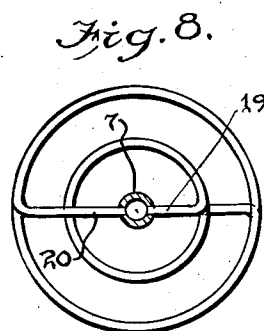
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4 Sheets-Sheet 3



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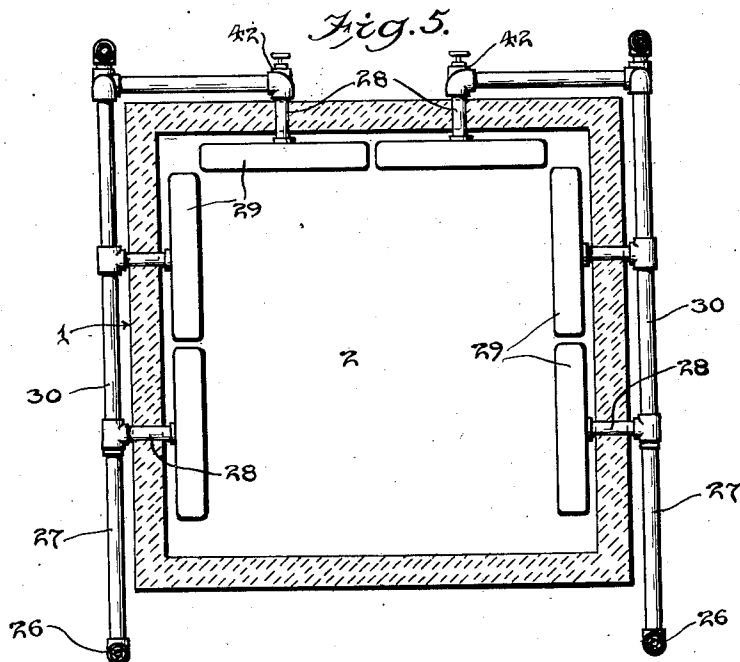
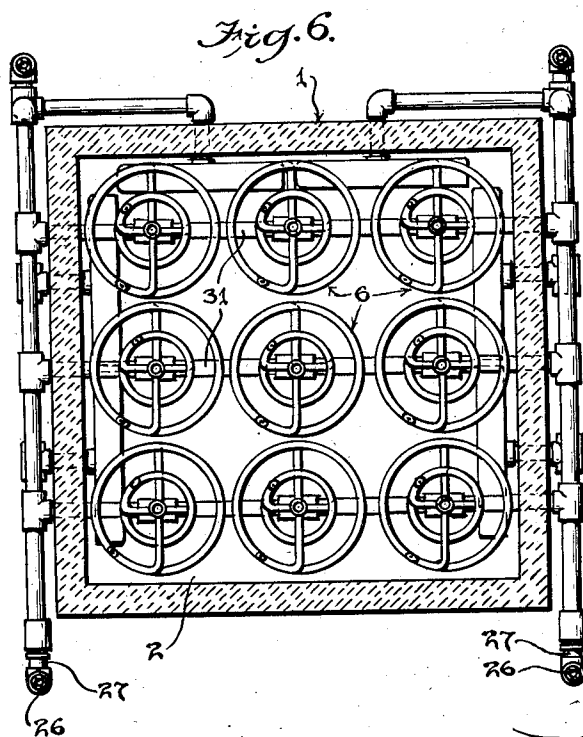
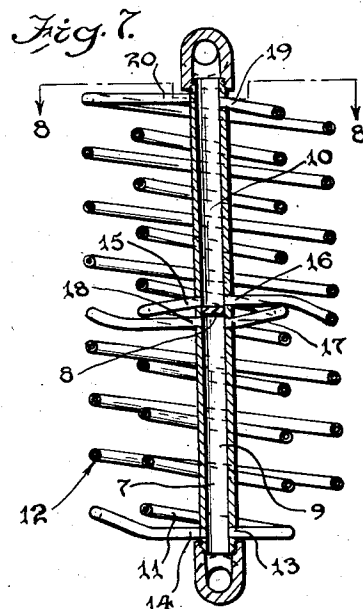
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UNITED STATES PATENT OFFICE

2,043,883

HEATING SYSTEM

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Application March 25, 1935, Serial No. 12,957

15 Claims. (Cl. 122-252)

The invention relates to improvements in heating systems.

The object of the present invention is to improve the construction of heating systems more especially the construction of boilers for steam heating systems, hot water heating systems and vapor heating systems and to eliminate therefrom long water heating coils. Long coils in boilers have a short life because the intense heat forces the water out of the coils, leaving nothing to protect the coils but hot and almost dry vapor or superheated steam which causes erosion to set up or practically causes the coils to burn out.

It is an object of the present invention to provide a water heating unit adapted to take the place of long coils and having a plurality of short coils sufficient in number to supply the necessary total coil length and equally efficient with respect to heating qualities as long coils.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:

Figure 1 is a side elevation of a portion of a heating system constructed in accordance with this invention and showing a boiler and steam drum for steam heating.

Figure 2 is a vertical sectional view of the same partly in elevation.

Figure 3 is a horizontal sectional view taken substantially on the line 3-3 of Figure 2.

Figure 4 is a similar view taken substantially on the line 4-4 of Figure 2.

Figure 5 is a horizontal sectional view on the line 5-5 of Figure 2.

Figure 6 is a horizontal sectional view on the line 6-6 of Figure 2.

Figure 7 is an enlarged vertical sectional view of one of the multiple coil water heating units.

Figure 8 is a transverse sectional view of the same on the line 8-8 of Figure 7.

In the accompanying drawings and in which is illustrated the preferred form of the invention 1 designates a boiler having a fire pot or combustion chamber 2 in its lower portion and provided at the front of its lower portion with doors

2^a and 3 communicating with the fire pot or combustion chamber and with the ash pit 4 or space below the fire pot or combustion chamber. In practice the boiler will be provided with a suitable grate (not shown) but it will be understood that any fuel or heating means may, of course, be employed, such as coal, oil or gas and while the boiler is shown rectangular in cross-section it may be of any other desired configuration.

The boiler is equipped with upper and lower groups of multiple coil water heating units 5 and 6 arranged in rows of the required number, three rows of three units each being shown in the accompanying drawings for convenience of illustration. Each of the multiple coil water heating units is of the same construction and consists of a central vertical pipe 7 and relatively short upper and lower inner and outer coils. The central vertical pipe 7 is provided with a central horizontal partition 8 which divides the pipe 7 into lower and upper inlet and outlet chambers or sections 9 and 10. The inner and outer lower coils 11 and 12 surround the lower section of the vertical pipe 7 and have their lower ends 13 and 14 secured to the vertical pipe 7 at the lower portion thereof and communicating with the interior of the same. The upper ends 15 and 16 of the lower inner and outer coils are connected with the upper section or chamber 10 of the pipe 7 at the lower portion thereof.

The lower ends 17 and 18 of the inner and outer upper coils are secured to the pipe 7 and are connected with the same at the upper portion of the lower chamber or section 9 and the upper ends 19 and 20 of the inner and outer upper coils are connected with the upper section or chamber 10 of the pipe 7 at the upper portion thereof. The terminals of the coils are preferably welded in openings in the vertical pipe 7 but they may be secured to the same in any other desired manner as will be readily understood. The inner and outer coils are of different diameters and are preferably arranged concentric with the pipe 7 which is located centrally of the inner and outer coils. While double coils are shown at both the upper and lower portions of the vertical pipe 7 it will be apparent that a single coil may be employed for each of the chambers or sections of the pipe 7 if desired. By providing the inner and outer lower and upper coils and the divided pipe 7 relatively short coils may be employed instead of a single continuous long coil and water is introduced into the lower

chamber at the lower end thereof and in circulating through the vertical pipe 7 and in passing from the lower chamber to the upper chamber thereof will circulate through the inner and outer coils, water from the lower portion of the lower chamber being delivered to the lower portion of the upper chamber and water from the upper portion of the lower chamber being delivered to the upper portion of the upper chamber.

The upper group of multiple coil water heating units constitute a preheater and are connected with a return pipe 21 which receives water of condensation from room radiators (not shown) of the heating system. The upper preheater group of multiple coil units are located above and spaced from the fire pot or combustion chamber and the lower group of multiple coil units are located below the upper group in the space between the upper group and the fire pot or combustion chamber. The lower ends of the vertical pipes of the upper group of multiple coil units are connected by lower and upper transverse pipes 22 and 23 and the lower and upper transverse pipes are connected by lower and upper horizontal side pipes 24 and 25. The transverse pipes 22 and 23 preferably extend through the sides of the boiler and the lower and upper horizontal side pipes 24 and 25 are preferably arranged exteriorly of the boiler as clearly illustrated in Figures 3 and 4 of the drawings. The return pipe 21 from the room radiators is connected with the lower side pipes of the upper group of multiple coil units for delivering the water of condensation to the preheater group of multiple coil units at the lower ends thereof.

The upper horizontal side pipes are connected by vertical connecting pipes 26 located at the front portion of the boiler at opposite sides thereof and connected at their upper portions with the said horizontal side pipes 25 and extending downwardly therefrom to the lower portion of the boiler and provided at their lower ends with horizontal arms or extensions 27 approximately L-shaped and extending across the sides of the boiler at the lower portion thereof and partially across the back and connected by short pipes 28 with fire pot or combustion chamber radiators 29 located within the fire pot or combustion chamber of the boiler and receiving the preheated water from the upper group of multiple coil units. The combustion chamber radiators which may be of any desired construction are connected at the top by short pipes 29 with horizontal approximately L-shaped pipes 30 extending across the sides of the boiler and partially across the back of the same as clearly illustrated in Figure 5 of the drawings.

The lower group of multiple coil units 6 are connected by lower and upper transverse pipes 31 and 32 extending across the boiler and through the same and connected at their terminals with lower and upper horizontal side pipes 33 and 34. The lower horizontal side pipes 33 are connected at 35 by suitable couplings with the upper radiator connecting pipes 30 and the water heated by the radiators enters the latter at the bottom thereof and leaves the radiators at the top of the same and flows into the lower ends of the vertical pipes of the lower multiple coil units. The upper horizontal side pipes 34 of the lower group of multiple coil units are connected by feed pipes 36 with a steam drum 37 preferably located above the boiler and disposed transversely of the same but the steam drum may be arranged in any other desired position either at the top of the boiler or at any other place on the same should convenience re-

quire or dictate a different position of the steam drum. When the boiler is used in a hot water heating system the steam drum, of course, will not be necessary and may be omitted. The upper group of preheater multiple coil units are located at a point where the gases and other products of combustion are the coolest before passing off into the smoke pipe (not shown) but it has been found that such gases and products of combustion have sufficient heat to raise the temperature of water in a steam heating system to approximately 220° F. and in a water heating system to raise the temperature of the water to approximately 180° F. The heat is practically all absorbed by the radiators and the upper and lower groups of multiple coil heating units so that comparatively little heat is wasted and escapes through the smoke pipe to the chimney.

A main feed pipe 38 leading to the room radiators (not shown) is connected with the steam drum at the top thereof and drain pipes 39 which are connected with the steam drum at the bottom thereof extend from the ends of the steam drum to the upper ends of the vertical connecting pipes 26. The vertical connecting pipes 26 are also connected by vent pipes 40 with the steam drum at points above the drain pipe to prevent the formation of a steam lock which might interfere with the circulation of water through the groups of multiple coil water heating units and the combustion chamber radiators. A thermometer 41^a is connected with one of the upper horizontal side pipes of the lower group of multiple coil water heating units for indicating the temperature of the water or steam fed to the steam drum and in practice the boiler will be provided with suitable gauges (not shown) and a pressure relief valve (not shown) when such instruments are desirable or necessary. The heating system is provided with drain cocks 41, 42 and 43. The drain cock 41 which is preferably connected with the return pipe 21 at the bottom thereof is for draining the upper group of multiple coil water heating units but it may be located at any other desired point. The drain cocks 42 and 43 are for draining the lower group of multiple coil water heating units, the radiators and also the steam drum. The drain cock 42 is preferably connected with one of the arms or pipes 27 and the other drain cock 43 is preferably located at the lower end of the vertical connecting pipe 26. These drain cocks may be located at any other convenient point and any desired number of drain cocks may be provided.

What is claimed is:

1. In a heating system, a boiler including a multiple coil water heating unit comprising a pipe provided between its ends with a partition dividing the pipe into an inlet chamber and an outlet chamber, and relatively short coils located at the inlet and outlet chambers and surrounding the said pipe, said coils being in connection at one end with the inlet chamber at a point adjacent to one end of the latter, and being in connection at their opposite end with a corresponding point of the outlet chamber.

2. In a heating system, a boiler including a multiple coil water heating unit comprising a pipe provided between its ends with a partition dividing the pipe into an inlet chamber and an outlet chamber each having an inlet and an outlet end, and a plurality of relatively short coils of different diameters arranged one within the other and surrounding each of the chambers of the said pipe, the inlet ends of the coils of the

inlet and outlet chambers being connected with the inlet chamber adjacent to one end thereof and the outlet ends of the coils being connected with the outlet chamber adjacent to the corresponding end thereof and each of the coils being arranged to connect the inlet and outlet chambers whereby water entering the inlet chamber is caused to pass through the same and through the coils into the outlet chamber.

3. In a heating system, a boiler including a multiple coil water heating unit comprising a vertical pipe provided between its ends with a partition forming separate lower inlet and upper outlet chambers, and relatively short upper and lower coils surrounding the inlet and outlet chambers of the pipe, the lower coil having its lower end connected with the inlet chamber at the lower portion thereof and its upper end connected with the outlet chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the inlet chamber and its upper end connected with the upper portion of the outlet chamber of the said vertical pipe.

4. In a heating system, a boiler including upper and lower groups of multiple coil water heating units each comprising a vertical pipe provided between its ends with a partition dividing the interior of the pipe into separate upper and lower chambers and relatively short upper and lower coils surrounding the said pipe, the lower coil having its lower end connected with the lower chamber at the lower portion thereof and with the upper chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the lower chamber and the upper portion of the upper chamber, means for connecting the upper group of multiple coil units with one another and with a return pipe to form a preheater, means for connecting the lower group of multiple coil water heating units with one another and with the said upper group of units, and a feed pipe connected with the lower group of water heating units.

5. In a heating system, a boiler including upper and lower groups of multiple coil water heating units each comprising a vertical pipe provided between its ends with a partition dividing the interior of the pipe into separate upper and lower chambers and relatively short upper and lower coils surrounding the said pipe, the lower coil having its lower end connected with the lower chamber at the lower portion thereof and with the upper chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the lower chamber and the upper portion of the upper chamber, means for connecting the lower ends of the vertical pipes of the upper group of water heating units with one another and with a return pipe to form a preheater, means for connecting the lower ends of the vertical pipes of the lower group of water heating units with the upper ends of the vertical pipes of the upper group of water heating units, and a feed pipe connected with the upper ends of the vertical pipes of the lower group of water heating units.

6. In a heating system, a boiler including upper and lower groups of multiple coil water heating units each comprising a vertical pipe provided between its ends with a partition dividing the interior of the pipe into separate upper and lower chambers and relatively short upper and lower coils surrounding the said pipe, the lower coil having its lower end connected with

the lower chamber at the lower portion thereof and with the upper chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the lower chamber and the upper portion of the upper chamber, means for connecting the upper group of multiple coil units with one another and with a return pipe to form a preheater, means for connecting the lower group of multiple coil water heating units with one another and with the said upper group of units, a steam drum, and a feed pipe connecting the lower group of units with the steam drum.

7. In a heating system, a boiler including upper and lower groups of multiple coil water heating units each comprising a vertical pipe provided between its ends with a partition dividing the interior of the pipe into separate upper and lower chambers and relatively short upper and lower coils surrounding the said pipe, the lower coil having its lower end connected with the lower chamber at the lower portion thereof and with the upper chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the lower chamber and the upper portion of the upper chamber, means for connecting the lower ends of the vertical pipes of the upper group of water heating units with one another and with a return pipe to form a preheater, means for connecting the lower ends of the vertical pipes of the lower group of water heating units with the upper ends of the vertical pipes of the upper group of water heating units, a steam drum, and a feed pipe connected with the upper ends of the vertical pipes of the lower group of water heating units and with the steam drum.

8. In a heating system, a boiler including upper and lower groups of multiple coil water heating units each comprising a vertical pipe provided between its ends with a partition dividing the interior of the pipe into separate upper and lower chambers and relatively short upper and lower coils surrounding the said pipe, the lower coil having its lower end connected with the lower chamber at the lower portion thereof and with the upper chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the lower chamber and the upper portion of the upper chamber, means for connecting the upper group of multiple coils units with one another and with a return pipe to form a preheater, means for connecting the lower group of multiple coil water heating units with one another and with the said upper group of units, a steam drum located above the boiler, a feed pipe connecting the lower group of units with the steam drum, and a vent pipe connecting the upper group of water heating units with the steam drum to prevent the formation of a steam lock and interference with circulation through the water heating units.

9. In a heating system, a boiler including upper and lower groups of multiple coil water heating units each comprising a vertical pipe provided between its ends with a partition dividing the interior of the pipe into separate upper and lower chambers and relatively short upper and lower coils surrounding the said pipe, the lower coil having its lower end connected with the lower chamber at the lower portion thereof and with the upper chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the lower chamber and the upper portion of the upper

chamber, means for connecting the lower ends of the vertical pipes of the upper group of water heating units with one another and with a return pipe to form a preheater, means for connecting the lower ends of the vertical pipes of the lower group of water heating units with the upper ends of the vertical pipes of the upper group of water heating units, a steam drum located above the boiler, a feed pipe connecting the steam drum with the upper ends of the vertical pipes of the lower group of water heating units, and a drain pipe connecting the steam drum with the upper ends of the vertical pipes of the upper group of water heating units to prevent the formation of a steam lock and interference with circulation through the upper and lower groups of water heating units.

10. In a heating system, a boiler including a fire pot, an upper preheater group of multiple coil water heating units located above and spaced from the fire pot, a lower group of multiple coil water heating units located above the fire pot and between the same and the upper preheater group of water heating units, radiators located within the fire pot, a return pipe connected with the upper preheater group of multiple coil water heating units, means for connecting the upper group of water heating units with the fire pot radiators, means for connecting the fire pot radiators with the lower group of multiple coil water heating units, and a feed pipe connected with the lower group of multiple coil water heating units.

11. In a heating system, a boiler including a fire pot, an upper preheater group of multiple coil water heating units located above and spaced from the fire pot, a lower group of multiple coil water heating units located above the fire pot and between the same and the upper preheater group of water heating units, each of said multiple water heating units comprising a vertical pipe provided between its ends with a partition forming separate lower and upper inlet and outlet chambers and relatively short coils surrounding the pipe at the said chambers, each of the coils having its ends communicating with both of the chambers and forming a communication between the inlet and outlet chambers of the pipe, radiators located within the fire pot, a return pipe connected with the upper preheater group of multiple coil water heating units, means for connecting the upper group of water heating units with the fire pot radiators, means for connecting the fire pot radiators with the lower group of multiple coil water heating units, and a feed pipe connected with the lower group of multiple coil water heating units.

12. In a heating system, a boiler including a fire pot, an upper preheater group of multiple coil water heating units located above and spaced from the fire pot, a lower group of multiple coil water heating units located above the fire pot and between the same and the upper preheater group of water heating units, radiators located within the fire pot, a return pipe connected with the upper preheater group of multiple coil water heating units, means for connecting the upper group of water heating units with the fire pot

radiators, means for connecting the fire pot radiators with the lower group of multiple coil water heating units, a steam drum located above the boiler, a feed pipe connecting the steam drum with the upper outlet chambers of the vertical pipes of the lower group of multiple coil water heating units, and means for also connecting the steam drum with the upper ends of the vertical pipes of the upper preheater group of water heating units to prevent a steam lock interfering with circulation of water through the water heating units and the radiators.

13. In a heating system, a boiler including upper and lower groups of multiple coil units arranged in rows and each comprising a vertical pipe having its interior divided into two separate chambers, the lower chamber constituting an inlet chamber and the upper chamber an outlet chamber, and a plurality of coils surrounding the pipe and each having one terminal connected with the lower chamber and the other terminal with the upper chamber, upper and lower transverse pipes connecting the multiple coil units of each row, upper and lower side pipes connecting the transverse pipe, means for connecting the upper side pipes of the upper group of multiple coil heating units with the lower side pipes of the lower group of multiple coil units, and a feed pipe connected with the upper side pipes of the lower group of multiple coil units.

14. In a heating system, a boiler including upper and lower groups of multiple coil units arranged in rows and each comprising a vertical pipe having its interior divided into two separate chambers, the lower chamber constituting an inlet chamber and the upper chamber an outlet chamber, and a plurality of coils surrounding the pipe and each having one terminal connected with the lower chamber and the other terminal with the upper chamber, upper and lower transverse pipes connecting the multiple coil units of each row, upper and lower side pipes connecting the transverse pipe, radiators located below the lower group of multiple coil units, means for connecting the upper side pipes of the upper group of multiple coil units with the radiators at the bottoms thereof, means for connecting the lower side pipes of the lower group of multiple coil units with the radiators at the tops thereof, and a feed pipe connected with the upper side pipes of the lower group of multiple coil units.

15. A water heating device comprising a vertical pipe provided between its ends with a partition forming separate lower inlet and upper outlet chambers, and relatively short upper and lower coils surrounding the inlet and outlet chambers of the pipe, the lower coil having its lower end connected with the inlet chamber at the lower portion thereof and its upper end connected with the outlet chamber at the lower portion of the same and the upper coil having its lower end connected with the upper portion of the inlet chamber and its upper end connected with the upper portion of the outlet chamber of the said vertical pipe.

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