Oct. 21, 1952

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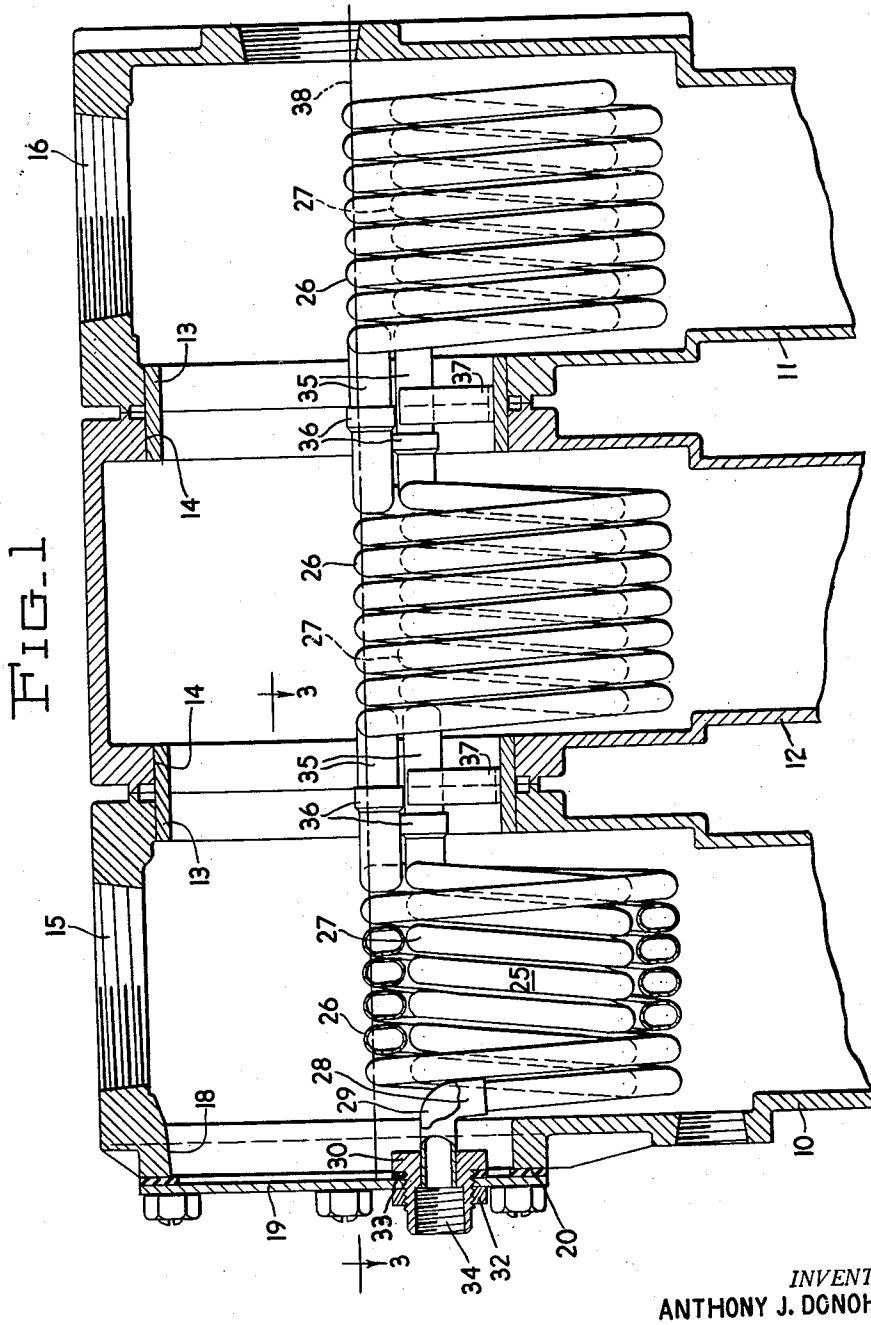
2,614,542

INDIRECTLY HEATED COIL FOR BOILERS WITH VERTICAL SECTIONS

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2 SHEETS—SHEET 1

FIG. 1



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2 SHEETS—SHEET 2

FIG. 2

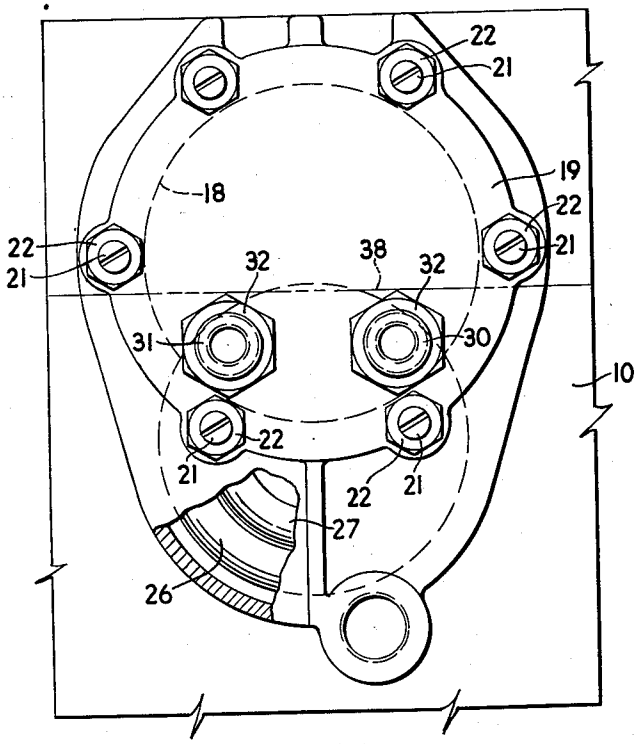
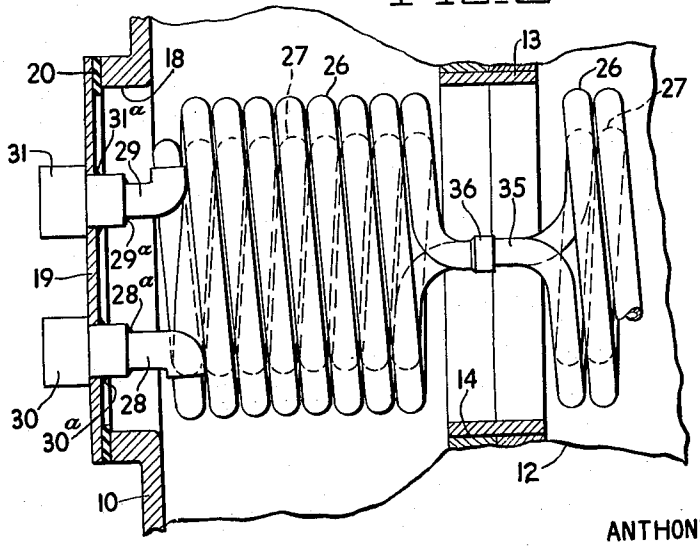


FIG. 3



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INDIRECTLY HEATED COIL FOR BOILERS WITH VERTICAL SECTIONS

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4 Claims. (Cl. 122—32)

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This invention relates to coils for tankless water heaters adapted for installation in domestic heating boilers of the sectional type which are utilized to supply heat and domestic hot water.

It has heretofore been proposed to install various types of coil or immersion units in an end section of a cast iron sectional heating boiler with the coil disposed below the water line. Installations of this character have not proven wholly satisfactory because of the lack of circulation within the section in which the coil is inserted and the lack of satisfactory circulation between that section and the other boiler sections through the top and bottom push nipple openings.

The installation of an immersion heater wholly within one section of domestic boilers produces an appreciable temperature difference between the boiler section in which the unit is mounted and the other boiler sections. This necessitates lower settings of boiler temperature limit controls in order to prevent steaming in steam boilers or lifting of check valves on forced hot water installations. The use of such lowered boiler water temperatures necessarily reduce the quantity and temperature of domestic hot water which is available.

As a result of the difficulties encountered in this service cast iron sectional boilers have not been employed to a normal extent in the smaller sizes. The reduction of size of such sectional boilers has only aggravated the difficulties.

In accordance with the present invention, an improved coil is provided, suitable for use in sectional cast iron boilers, whether for steam or hot water heating and even though the boiler is of relatively small size and capacity.

In accordance with the present invention, also, an improved type of domestic water heating coil is provided which is adapted to be inserted in and through one of the nipple openings of the boiler.

In accordance with the present invention, also, a domestic water heating coil is provided, for insertion through one of the nipple openings of a cast iron boiler, the coil being constructed to permit of lowering of the same, after insertion, to a position below the normal water line of the boiler.

In accordance with the present invention, also, an improved domestic water heating coil of the submerged type is provided which is particularly suitable for use in sectional cast iron boilers and which is effective for both steam and hot water boilers.

Other objects and advantageous features of the invention will be apparent from the specification and claims.

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The nature and characteristic features of the invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which:

Figure 1 is a fragmentary sectional view of the upper portion of a sectional boiler, taken from front to rear, and showing the heating coil in operating position therein;

Fig. 2 is a fragmentary front elevational view of a portion of the boiler shown in Fig. 1, and illustrating the attaching of the coil head; and

Fig. 3 is a fragmentary sectional view taken approximately on the line 3—3 of Fig. 1, and showing a modified form of connection between the coil and mounting plate.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes may be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

Referring now more particularly to the drawings, the upper ends of a plurality of front and rear end sections of a cast iron sectional boiler are shown at 10 and 11, between which one or more intermediate sections 12 are adapted to be interposed to provide the desired heating capacity of the boiler. The sections 10, 11 and 12 are connected at their upper portions in the conventional manner by nipples 13 pressed or otherwise placed in position in alined nipple openings 14 at the time of assembly of the sections 10, 11 and 12.

The end sections 10 and 11 may be provided with the customary tapped openings 15 and 16 for the connection of pipes (not shown), which may serve for the delivery of hot water or steam for use in the heating system in the usual manner.

The end section 10, in accordance with the present invention, is provided with an opening 18, alined with the nipple openings 14 of the other sections and preferably of the same diameter. A coil mounting plate 19 is provided having a sealing gasket 20 which is secured in fluid tight engagement with the end face of the section 10 by studs 21 and nuts 22. The coil mounting plate 19 is adapted to support the domestic water heating coil, shown generally at 25 and provide for the connection of hot and cold water pipes, as hereinafter explained.

The domestic water heating coil 25 is preferably made of a plurality of section unit coils, the

unit for each section including an outer coil **26** and an inner coil **27**.

Each of the outer coils **26**, of each section unit, is preferably formed as a helical coil, with a plurality of turns or convolutions, and either right-handed or left-handed, as desired, and with the maximum diameter of the coil **26** slightly less than the interior diameter of the nipples **13**. The number of turns in each section coil **26** is determined by the space available in each boiler section **10**, **11** or **12**, between the nipples **13**.

The inner section coils **27** are respectively disposed within the outer section coils **26**, with a plurality of turns or convolutions, and preferably of the opposite hand from that of the coils **27**. The coils **26** and **27** are preferably formed from copper tubing, with an initial outside diameter of the order of ⅝ inch, and is preferably flattened to permit of a larger number of convolutions in a particular linear distance without unduly increasing the pressure drop across the coil.

The outer coil **26** and the inner coil **27** in the boiler section **10** are provided with terminal ends **28** and **29**. The outer ends **28** and **29** are offset with respect to the central longitudinal axis of the coil assembly **25** and also offset with respect to the center of the plate **19**. The ends **28** and **29** are respectively connected to connectors **30** and **31**. As shown in Figs. 1 and 2, the connectors **30** and **31** each have externally threaded portions for the engagement of nuts **32**, washers or gaskets **33** being interposed between the inner heads of the connectors **30** and **31** and the plate **19**. Upon tightening of the nuts **32**, fluid tight connections through the plate **19** are provided. The connectors **30** and **31** are internally threaded as at **34** for the connection of the cold water supply and hot water delivery pipes for the domestic hot water.

A modified form of connection is shown in Fig. 3, in which the terminal ends **28** and **29** are welded to the connectors **30** and **31** by welds **28a** and **29a** and the connectors **30** and **31** are welded to the plate **19**, by welds **30a** and **31a**.

The inner ends of the coils **26** and **27** in the section **10**, both ends of the coils **26** and **27** in the intermediate sections **11**, and the inner ends of the coils **26** and **27** in the boiler section **12** are provided with horizontally disposed tubular portions **35**, with connecting sockets **36**, to permit of soldering or otherwise joining the outer coils **26** in series and the inner coils **27** in series.

The inner and outer coils **26** and **27** in the boiler section **11**, or at the rear or inner end of the coil **25**, are preferably made integral, the connection being effected at the time of making these coils **26** and **27** by forming these coils from a single continuous piece of tubing. If desired, the lowermost tubular portion **35** of the coils **26** or **27** may have a supporting block **37** secured thereto, and adapted to rest in supporting relation within the connecting nipples **13**, intermediate the ends of the coil assembly **25**.

It will be noted that the sets of inner and outer coils **26** and **27** are shown as corresponding in number to the number of sections in the boiler, although a lesser number could be employed, depending upon the particular domestic water heating capacity desired.

The coil assembly **25**, comprising the series of connected coils **26** and **27** secured to the plate **19**, is inserted through the opening **18** and the inner end advanced respectively through the connecting nipples **13** until the plate **19** is close to the opening **18**. The assembly is then dropped or permitted to drop downwardly with each pair of coils **26** and **27** in one of the boiler sections and with the tubular portions spanning the respective nipples **13**. The plate **19** is then clamped in position by the nuts **22**. The pairs of coils **26** and **27** are thus disposed in pendant position below the normal water level of the boiler which is indicated by the line **38**.

I claim:

1. In domestic water heating apparatus for a sectional boiler with axially alined connecting members between the water spaces of the boiler sections, the combination comprising a mounting plate, an indirectly heated water heater connected to said plate for insertion through the connecting members and for axial positioning in offset relation to the axis of the connecting members, said water heater having a plurality of tubular water conducting coils each of a length for reception in a boiler section below the connecting members, said heater coils having tubular water conducting spacing connecting portions therebetween bridging said connecting members.

2. In domestic water heating apparatus for a sectional boiler with axially alined connecting members between the water spaces of the boiler sections, the combination comprising a mounting plate, an indirectly heated water heater connected to said plate for insertion through the connecting members and for axial positioning in offset relation to the axis of the connecting members, a plurality of tubular water conducting coils having longitudinal axes alined and normal to said plate and each coil being of a length for reception in a boiler section below the connecting members, said coils having tubular water conducting spacing connecting portions therebetween bridging said connecting members.

3. Apparatus as defined in claim 1 in which the conducting coils have inner and outer coil sections.

4. Apparatus as defined in claim 1 in which the conducting coils have inner and outer coil sections axially oppositely pitched.

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