

June 23, 1953

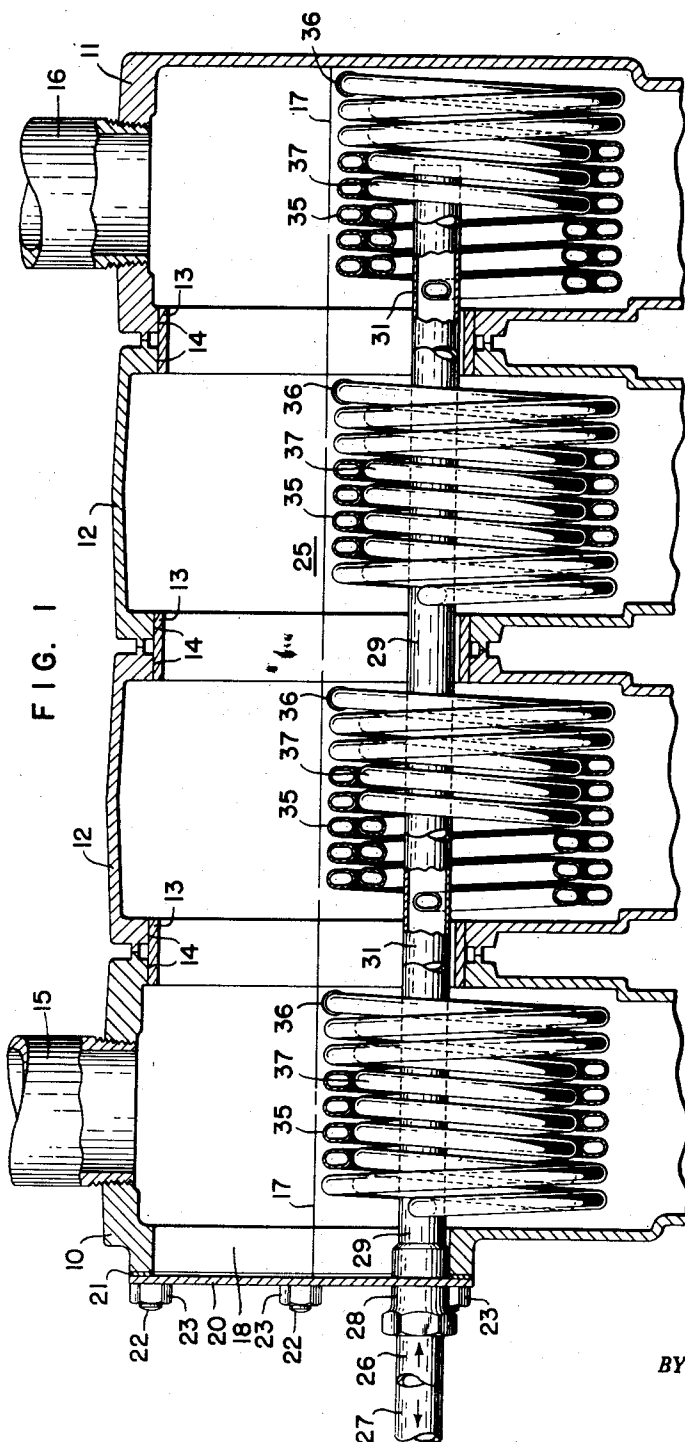
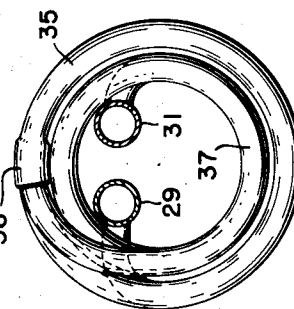
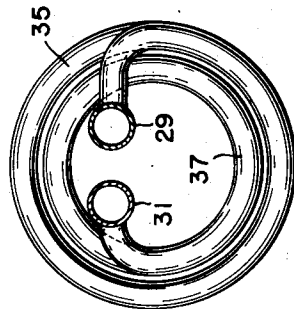
A. J. DONOHUE

2,642,849

COIL FOR TANKLESS WATER HEATERS

Filed March 8, 1952

2 Sheets-Sheet 1



INVENTOR.
A. J. DONOHUE
BY
J. T. Woburnsmith
ATTORNEY.

June 23, 1953

A. J. DONOHUE

2,642,849

COIL FOR TANKLESS WATER HEATERS

Filed March 8, 1952

2 Sheets-Sheet 2

FIG. 2

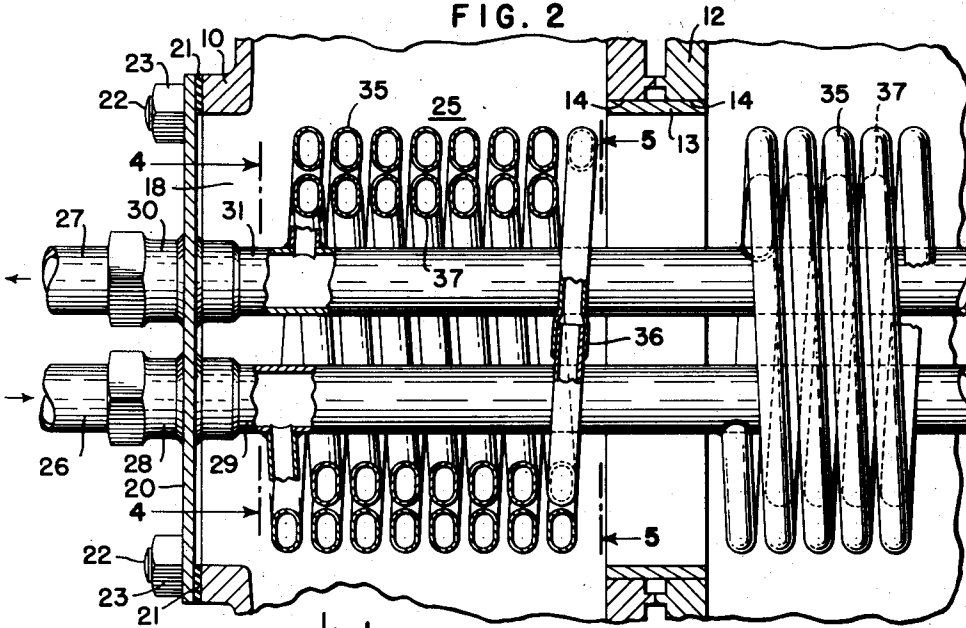
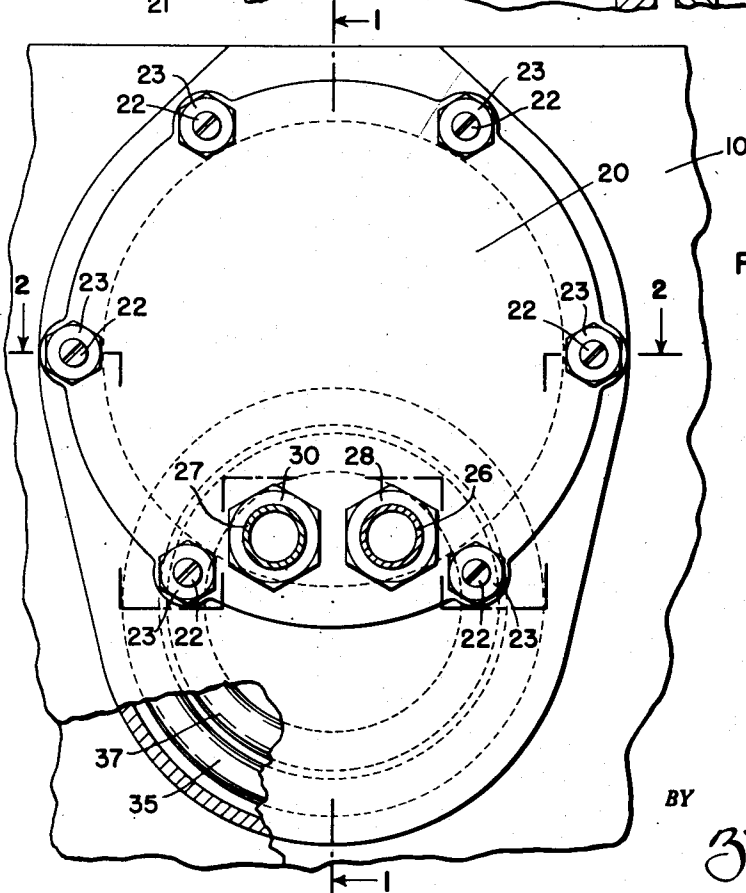


FIG. 3



INVENTOR.
A. J. DONOHUE

BY

J. T. Wobenshaw
ATTORNEY.

UNITED STATES PATENT OFFICE

2,642,849

COIL FOR TANKLESS WATER HEATERS

Anthony J. Donohue, Merion, Pa.

Application March 8, 1952, Serial No. 275,511

7 Claims. (Cl. 122—32)

1

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 one 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 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 reduces 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 well received in the smaller sizes. The reduction of size of such sectional boilers has only aggravated the difficulties.

In my prior application for Letters Patent for Coil for Tankless Water Heaters, filed June 21, 1950, Serial No. 169,452, there is shown a pendant coil which is quite satisfactory for certain types of service, but which also has certain limitations as to capacity, where the demand for domestic hot water is in excess of about 4 or 5 gallons per minute, particularly when installed in boilers having a relatively large number of sections of the order of five or more.

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 which is particularly adapted for larger sizes and capacities of sectional cast iron boilers.

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

In accordance with the present invention also, a domestic hot water heating coil is provided, for insertion through the nipple openings of a cast iron sectional boiler, the coil being constructed to

2

permit of lowering 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 in which the pressure drop through the coil is kept to a minimum while providing high heat transfer characteristics, and which is particularly suitable for use in sectional cast iron boilers where the demand for domestic hot water is high and of the order of 8 gallons or more per minute.

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

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, taken approximately on the line 1—1 of Fig. 3 of the upper portion of a cast iron sectional boiler from front to rear and showing the heating coil in operating position therein;

Fig. 2 is a fragmentary horizontal sectional view, enlarged, of the coil in position in the boiler, and taken approximately on the line 2—2 of Fig. 3;

Fig. 3 is a fragmentary front elevational view of a portion of the boiler shown in Fig. 1, and illustrating the attachment of the coil head, parts being broken away to show the details of construction;

Fig. 4 is a transverse sectional view taken approximately on the line 4—4 of Fig. 2; and

Fig. 5 is a transverse sectional view taken approximately on the line 5—5 of Fig. 2.

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 have the interiors thereof in communication, and are connected for this purpose by fluid tight connections of any desired type. A suitable connection is

3

shown consisting of 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 for the connection of pipes 15 and 16 which may serve for the delivery of hot water or steam for use in the heating system in the usual manner. The normal water level, if the boiler is used for steam heating, is indicated at 17.

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 20 is provided having a sealing gasket 21 which is secured in fluidtight engagement with the outer end face of the section 10 by studs 22 and nuts 23.

The coil mounting plate 20 is adapted to support the domestic hot water heating coil shown generally at 25 and provide for the connection of a cold water supply pipe 26 and a domestic hot water delivery pipe 27, as hereinafter explained. Extending through the plate 20, in fluidtight relationship, a fitting 28 is provided, which is adapted for the connection of the cold water supply pipe 26 at the outer portion thereof and from the inner portion thereof, has extending inwardly a cold water manifold and supply pipe 29.

The plate 20 preferably also, has extending therethrough, in fluidtight relationship, a fitting 30 to the outer end of which the hot water delivery pipe 27 for supplying the hot water for domestic consumption is connected. The fitting 30 has, extending inwardly from the inner end thereof, a hot water delivery manifold or pipe 31.

The manifolds 29 and 31 are preferably of predetermined length in accordance with the total length available or to be utilized in the boiler sections 10, 11 and 12, and are closed at their inner ends.

At a plurality of locations along the manifold 29, and for each boiler section which is to be utilized for supplying heat to the water for domestic supply, an outer helical coil 35 is provided, connected at one end to the manifold 29 and connected at the other end, in any desired manner such as by a fitting 36 to an end of an inner concentric helical coil 37 of smaller diameter. The helical coil 37 is connected at its other end to the manifold 27. The coils 37 preferably have a plurality of turns or convolutions preferably provided of the opposite hand from that of the coils 35.

The coils 35 and 37 are preferably formed from copper tubing with an initial outside diameter of the order of $\frac{3}{8}$ inch, the tuning preferably being flattened to permit of disposing a larger number of convolutions in a particular linear distance without unduly increasing the pressure drop therethrough.

It will be noted that the longitudinal axis of the manifolds 26 and 27 is offset to one side of the common longitudinal axis of the coils 35 and 37, for purposes to be explained.

It will also be noted that the sets of inner and outer coils 37 and 35 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, comprising the manifolds 26 and 27 and the series of connected coils connected thereto is capable of insertion through and

4

for installation is inserted through the opening 18 and the inner end advanced respectively through the connecting nipples 13 until the plate 20 is close to the opening 18. The assembly is then dropped or permitted to drop downwardly with each pair of coils 35 and 37 in each of the boiler sections. The plate 20 is then clamped in position by the nuts 23. The respective pairs of series connected coils 35 and 37 are thus disposed in pendant position below the normal water level 17 of the boiler.

I claim:

1. In domestic water heating apparatus for a sectional boiler with horizontally alined connecting openings between the water spaces at the top of the boiler sections and with an opening in an end boiler section alined with said connecting openings, the combination comprising a mounting plate for closing said end opening, a pair of manifolds carried by said mounting plate for cold water supply and hot water delivery, a plurality of inner and outer helical coils surrounding said manifolds at a plurality of spaced locations, the outer coils of each pair being connected at one end to one of said manifolds and at the other end to one end of an inner coil and the other end of said inner coil being connected to the other of said manifolds.

2. In domestic water heating apparatus for a sectional boiler with horizontally alined connecting openings between the water spaces at the top of the boiler sections and with an end opening in an end boiler section alined with said connecting openings, the combination comprising a mounting plate for closing said end opening, a pair of manifolds normal to and supported by said mounting plate respectively for cold water supply and hot water delivery, pairs of nested inner and outer helical coils surrounding said manifolds at a plurality of spaced locations, the outer coils of each pair being connected at one end to one of said manifolds and at the other end to one end of the inner coil of the pair and the other end of said inner coil being connected to the other of said manifolds.

3. In domestic water heating apparatus for a section boiler with horizontally alined connecting openings between the water spaces at the top of the boiler sections and with an end opening in an end boiler section alined with said connecting openings, the combination comprising a mounting plate for closing said end opening, a pair of manifolds normal to and supported by said mounting plate for cold water supply and hot water delivery, pairs of concentric inner and outer helical coils of opposite hand surrounding said manifolds at a plurality of spaced locations, the outer coils of each pair being connected at one end to one of said manifolds and at the other end to one end of the inner coil of the pair and the other end of said inner coil being connected to the other of said manifolds, the spacings between said pairs of coils corresponding to the width of said connecting openings.

4. In domestic water heating apparatus for a sectional boiler with horizontally alined connecting openings between the water spaces at the top of the boiler sections and with an end opening in an end boiler section alined with said connecting openings, said boiler having a normal water level intermediate the top and bottom of said openings, the combination comprising a mounting plate for closing said end opening, a pair of manifolds normal to and supported by said mounting plate for cold water supply and hot water delivery, and

5

a plurality of groups of inner and outer helical coils surrounding said manifolds at a plurality of spaced locations, the spacing between the groups of coils corresponding to the width of said connecting openings, the outer coils of each group being connected at one end to one of said manifolds and at the other end to one end of an inner coil and the other end of the inner coil being connected to the other of said manifolds, and the longitudinal axis of the manifolds being offset upwardly from the longitudinal axis of the coils for axial positioning of the coils below the central horizontal axis of the connecting openings and below the normal water level of the boiler.

5. In domestic water heating apparatus for a sectional boiler with horizontally alined connecting openings between the water spaces at the top of the boiler sections and with an end opening in an end boiler section alined with said connecting openings, said boiler having a normal water level intermediate the top and bottom of said openings, the combination comprising a mounting plate for closing said end opening, a pair of manifolds normal to and supported by said mounting plate for cold water supply and hot water delivery, pair of inner and outer helical coils surrounding said manifolds at a plurality of spaced locations, the outer coils of each pair being connected at one end to one of said manifolds and at the other end to one end of the inner coil of the pair and the other end of said inner coil being connected to the other of said manifolds, the longitudinal axis of the manifolds being offset upwardly from the longitudinal axis of the coils for axial positioning of the coils below the central horizontal axis of the connecting openings and below the normal water level of the boiler.

6

6. In domestic water heating apparatus for a section boiler with horizontally alined connecting openings between the water spaces at the top of the boiler sections and with an end opening in an end boiler section alined with said connecting openings, the combination comprising a mounting plate for closing said end opening, a pair of manifolds carried by said mounting plate for cold water supply and hot water delivery, coil members surrounding said manifolds at a plurality of spaced locations, the coil members having ends respectively connected to said manifolds, and the coil members being eccentrically disposed with respect to said manifolds.

7. In domestic water heating apparatus, a pair of manifolds for cold water supply and hot water delivery, pairs of nested inner and outer coils surrounding said manifolds at a plurality of spaced locations, the coils of each pair being connected in series and also connected between said manifolds, said coils being eccentrically disposed with respect to said manifolds.

ANTHONY J. DONOHUE.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
947,308	Rich	Jan. 25, 1910
1,288,055	Langsenkamp	Dec. 17, 1918
2,614,542	Donohue	Oct. 21, 1952
2,617,392	Donohue	Nov. 11, 1952

FOREIGN PATENTS

Number	Country	Date
46,289	Switzerland	Dec. 7, 1908