V. F. DECKERT.

WATER HEATER.

APPLICATION FILED OCT. 10, 1917.

1,290,112.

Patented Jan. 7, 1919.

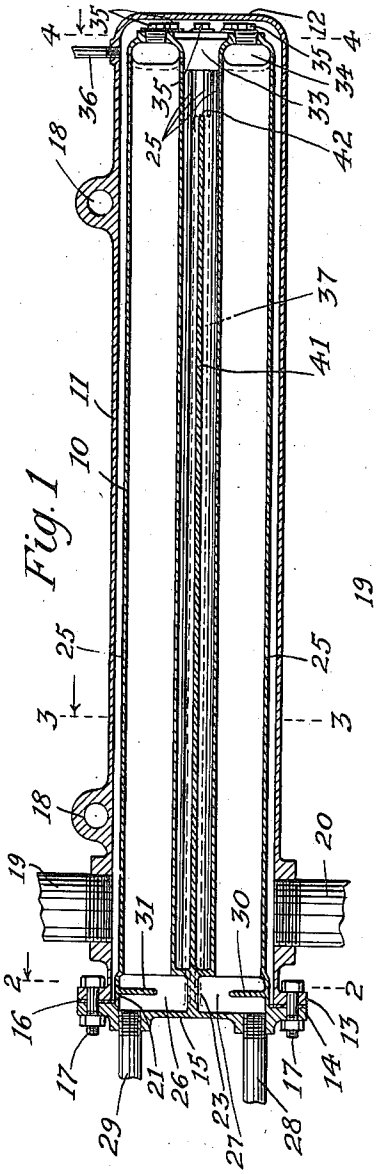


Fig. 1

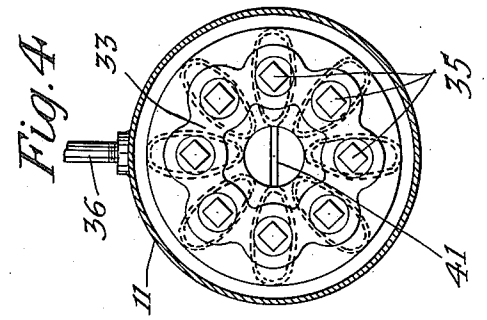


Fig. 4

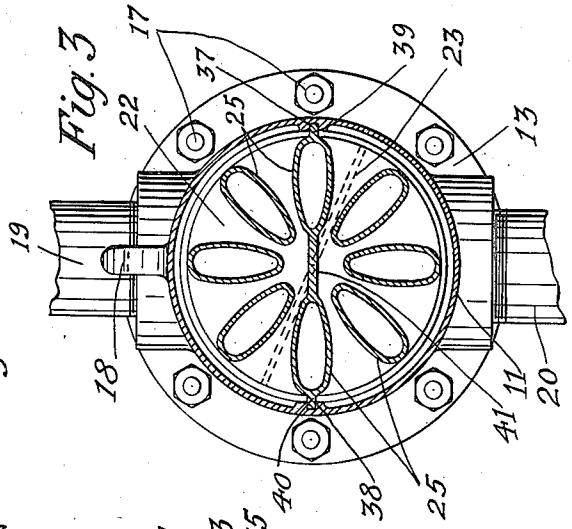


Fig. 3

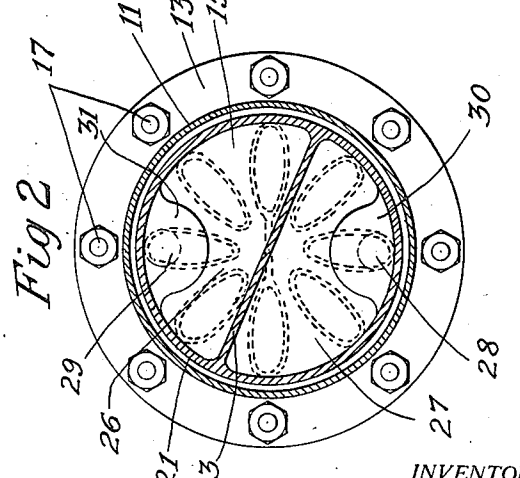


Fig 2

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WATER-HEATER.

1,290,112. Specification of Letters Patent. Patented Jan. 7, 1919.

Application filed October 10, 1917. Serial No. 195,844.

To all whom it may concern:

Be it known that I, VIRGIL F. DECKERT, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification.

My invention relates to water heaters and has for its object to provide a novel form of water heater adapted to be positioned in the circulatory system of ordinary heating apparatus for heating buildings such as hot water heating plants or steam heating plants. It is a principal object of my invention to provide such a device which shall contain a multiplicity of passages through which the water to be heated may be caused to flow, said passage-ways being themselves exposed to an extended flow of the heating medium such as steam or hot water. It is also an object of my invention in this connection to provide such a device which may be conveniently fabricated of cast metal in two pieces and assembled with only one simple annular joint thus insuring tightness and simplicity of packing.

The full objects and advantages of my invention will appear in connection with the detailed description thereof and are particularly pointed out in the claims.

In the drawings, illustrating the application of my invention in one form,—

Figure 1 is a sectional elevational view of my invention. Fig. 2 is a transverse sectional view on line 2—2 of Fig. 1. Fig. 3 is a transverse sectional view on line 3—3 of Fig. 1, and Fig. 4 is a section on line 4—4 of Fig. 1.

As illustrated my water heater comprises an inner casting member 10 and an outer shell 11. The shell 11 is a cylinder having a closed end 12 and an open end surrounded by a flange 13 which flange engages a corresponding flange 14 formed in conjunction with the end wall 15 of the central member 10. A packing-ring 16 extends between flanges 13 and 14 and by means of bolts 17 the parts are held together in water tight relation. Eye members 18 upon the top of the cylindrical portion of the shell 11 are adapted to serve as hangers by which the shell 11 and the inclosed core or interior member 10 are suspended in a horizontal position from the ceiling or from brackets extending from the wall. Inlet and outlet pipes 19 and 20 respectively admit and discharge the heating medium of the circulatory system to the interior of the shell where it is constrained to effectively flow around the parts of the interior member 10 as will hereinafter be pointed out.

Formed in conjunction with the end plate 15 and the connected flange 14 of the interior member 10 is a cylindrical casing 21 having an end 22 and a transverse partition 23 as shown in Figs. 2 and 3. Opening through the end 22 into the chamber formed within the cylindrical member 21 are a multiplicity of pipes 25 of elongated or oval cross section as clearly indicated in Fig. 3. As shown, there are eight of these pipes, four of which communicate with the chamber 26 formed on one side of the partition 23 and the other four communicate with the chamber 27 formed on the other side of the partition 23. An inlet pipe 28 and an outlet pipe 29 permit the water to be heated to enter and leave the interior member. Spreader plates 30 and 31 are positioned immediately above the opening from pipes 28 and 29 insuring that the water in circulating on either side of the partition 23 shall go through all of the members 25. These members at their other ends are united and open into a ring 33 shown in Figs. 1 and 4 which provides a circular channel 34 in communication with the interior of each of the pipe members 25. All of the pipe members therefore are in communication at one end, through the channel 34 formed in ring 33 and at the other end the pipe members communicate with the base member 15, but only half of said members with each of chambers 26 and 27 formed in said base member. It will thus be seen that several tubes 25 (in the example shown there being eight in number) are not only formed so as to provide a perfect circulatory arrangement with the fluid to be heated, going one way through half the tubes and the other way through the other half of the tubes, but the tubes are rigidly held at both ends in their separated and spaced relation. The ring 33 is provided with a multiplicity of passage-ways closed by screw plugs 35 by which access may be had to the interior of the several pipes 25 for cleaning or other purposes. These passage-ways have a still more important function for it is by this means that the core member formed within the various tubes may be removed after casting. This is an

important feature of my invention and one which is essential for its efficient practice, that the core member consisting of tubes 25 and the connecting and holding bases at the ends thereof shall be cast in one piece from gray iron. The passage-ways into ring 33 at the ends of the tubes enable the tube cores to be withdrawn. These passage-ways are readily milled and threaded and the screw plugs 35 in the same not only close the tubes but make it readily practical to clean their interior. A vent 36 which may connect with an air valve not shown, or a vacuum system, connects with the upper part of the chamber formed by shell 11. The shell 11 is formed with a pair of longitudinal grooves 37 and 38 which receive flanges 39 and 40 on diametrically opposite pipes 25 which are connected at their center with a web 41, thus forming a partition which divides the space within shell 11 into two equal portions. The web 41 terminates some distance before reaching the end of the shell, as indicated at 42 in Fig. 1. The steam or hot water pipe 19 admits hot water or steam into the interior of shell 11 and said hot water or steam is constrained by partition 41 to flow from one end of the chamber within the shell to the other end thereof where it passes through and around the ends of tubes 25 and over the end 42 of the partition 41 and back through the other half of the chamber to the return or outlet pipe 20. During all this flow the heating medium is in intimate contact with the extended walls of the oval shaped pipes 25 wherein water is circulating through inlet from pipe 28 and outlet through pipe 29. The effect of this is to heat pratically instantaneously the water within the tubes 25 and to keep this water heated while the same is being withdrawn.

The advantages of my invention will be apparent. It can be, and has been in practice, made entirely of two castings, the inner core casting 10 and the outer shell casting 11. Being made of ordinary gray cast iron it is comparatively free from the oxidizing effect of water. The construction may be made comparatively small and compact and may readily be applied at each point where hot water is desired. Thus, in an ordinary home one of these heaters may be employed in the kitchen to furnish hot water for culinary purposes; a second heater may be employed in the laundry, and a third heater in the bath room. Thus no long runs of pipe are required for delivering the hot water with the consequent loss of heat through radiation. There is no necessity of a great tank which over-heats the kitchen or place of storage during the period when water is not used and which, during times of hot fire in the furnace may rumble and boil and cause discomfort and frequently injury through explosion of the heating coil in the furnace. There is absolutely no loss of heat efficiency when hot water is not being withdrawn. The heating medium will simply flow past the water containing core member, which being heated to the same temperature as the heating medium has no effect upon it excepting only during the periods when hot water is being withdrawn.

I claim:

1. A water heater comprising a shell, a core member formed of a multiplicity of tubes secured in water tight relation within the shell, said core having flanges to slidably engage grooves in the interior wall of said shell, means on the core member for dividing the chamber within the shell into two communicating parts, means for introducing and withdrawing the fluid to be heated into and from the tubes so as to cause it to circulate through the same, and means for introducing a heated fluid into one chamber of the shell and withdrawing it from the other chamber of the shell whereby said heated fluid is caused to circulate around all said tubes.

2. A water heater comprising an outer shell, an inner core member formed of a multiplicity of tubes secured in water tight relation within the shell, said core having flanges to slidably engage grooves in the interior wall of said shell, means placing all of said tubes in communication at one end of the core member, a pair of chambers at the other end of the core, each chamber communicating with one-half of said tubes, a pipe for introducing the fluid to be heated into one of said chambers, a pipe for withdrawing said fluid from the other of said chambers, and means for circulating the heated fluid within the shell about all of said tubes.

3. A water heater comprising an outer shell having a pair of diametrically opposite longitudinal grooves, an inner core member formed of a multiplicity of tubes secured in water tight relation within the shell, a partition formed in conjunction with two of said tubes and having portions entering said grooves for dividing the chamber within the shell into two communicating parts, means for permitting the fluid to be heated to circulate through the tubes, inlet and outlet pipes respectively for introducing the heated fluid into the shell at one end of said partition and withdrawing it from the shell at the other side of the partition whereby said heated fluid is caused to circulate around all of said tubes.

4. A water heater comprising an elongated cast iron shell with a closed and an open end, an integral peripheral flange extended from the edge of the open end, a cast iron core member having a base chamber and a multiplicity of tubes in communication therewith and extending within the shell, means on

said core member for dividing the space within the shell into two equal portions communicating with each other at one end, a flange integrally connected with the base member and bolts extending through the flanges for uniting the shell and the core in water tight relation.

5. A water heater comprising an inner integral casting consisting of a cylindrical base, a multiplicity of tubes each in communication with the base at one end of said tubes, a partition member separating said tubes into two equal parts, a hollow ring casting integral with and in communication with each of said tubes at their other ends, said ring having core openings positioned opposite the end of each tube and screw plugs in said core openings and a cylindrical jacket inclosing said tubes.

6. A water heater comprising an inner casting consisting of a base having a transverse partition dividing the same into two compartments, two sets of tubes cast integrally with said base one set formed in communication with each of said compartments, a tubular ring cast integrally and in communication with all of said tubes at the other end, a pipe for admitting the fluid to be heated into one of said compartments, a pipe for withdrawing said fluid from the other of said compartments, and means on said core member for dividing the space within the shell into two equal portions communicating with each other at one end.

7. A water heater comprising an inner casting consisting of a base having a transverse partition dividing the same into two compartments, two sets of tubes cast integrally with said base one set formed in communication with each of said compartments, a tubular ring cast integrally and in communication with all of said tubes at the other end, a pipe for admitting the fluid to be heated into one of said compartments, a pipe for withdrawing said fluid from the other of said compartments, and a spreader fin within each of said compartments extended over the pipe opening to cause the fluid to be distributed to all of the tubes communicating with the respective compartments.

8. A water heater comprising an inner casting consisting of a cylindrical base, a multiplicity of tubes each in communication with the base at one end of said tubes, a hollow ring cast integral and in communication with each of said tubes at their other ends, said casting also comprising a transverse partition formed integral with some of said tubes and with said base, and an outer shell having grooves for receiving the edges of said partition to hold the tubes of said inner casting in fixed position within the shell.

In testimony whereof I hereunto affix my signature.

VIRGIL F. DECKERT.