Aug. 27, 1929. D. F. GARVEY 1,726,020

WATER HEATING APPARATUS

Filed May 23, 1928

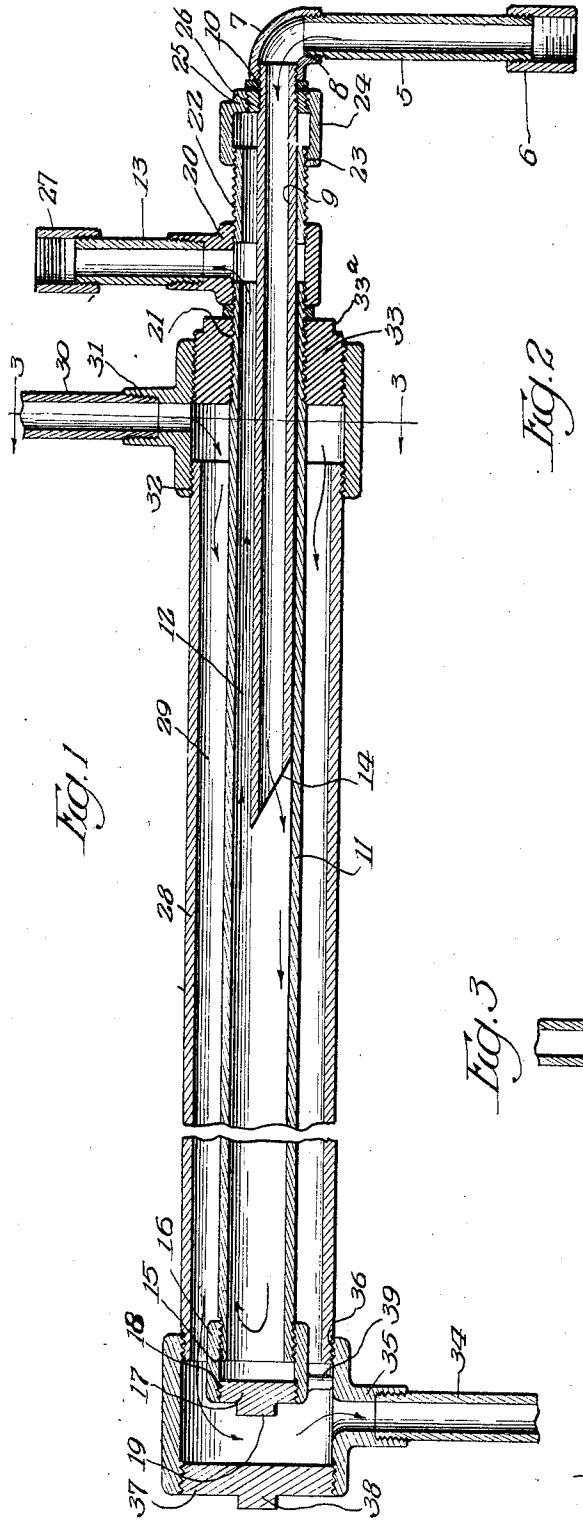

Fig. 1

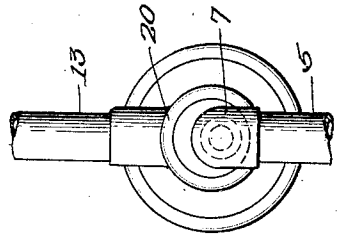

Fig. 2

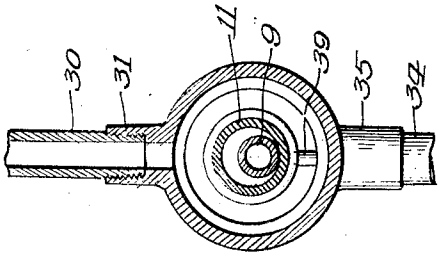

Fig. 3

Inventor
David F. Garvey
By Fred Herbert
Atty.

Patented Aug. 27, 1929. 1,726,020

UNITED STATES PATENT OFFICE.

DAVID F. GARVEY, OF CHICAGO, ILLINOIS.

WATER-HEATING APPARATUS.

Application filed May 23, 1928. Serial No. 279,868.

The invention relates to water heating apparatus and more particularly to that apparatus which is adapted to be connected to the water jacket of a steam boiler or similar heat producing device and is operative to heat the water in a storage tank.

One object of the present invention is to provide an apparatus of this character in which the various parts consist of standard pipes, fittings, couplings and plugs so that no bolts or similar connecting means are necessary and the assembly operation is facilitated.

Another object of the invention is to provide a water heating apparatus in which the parts are so arranged that access may be had thereto for cleaning and the maximum heating efficiency is obtained.

A further object of the invention is to provide a heating apparatus of the aforementioned type in which provision is made for readily removing the parts for repair or replacement purposes.

A still further object of the invention is to provide a water heating apparatus which is of a new and improved construction and may be fabricated or constructed at a comparatively low cost.

Other objects and advantages will be manifest from a consideration of the following detailed description.

The invention consists in the several novel features hereinafter set forth and more particularly defined by the claims at the conclusion hereof.

In the drawing which accompanies and forms a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a vertical longitudinal section of a water heating apparatus embodying the invention;

Figure 2 is an end view; and

Figure 3 is a transverse section taken on the line 3—3 of Figure 1 and illustrating in detail the eccentric position of the discharge pipe for the water that is to be heated.

The invention is exemplified in an apparatus which is adapted to be associated with a steam boiler or hot water circulating system and is operative to heat the water in a storage tank (not shown). Although the apparatus may be used in connection with any water storage tank, it is particularly and preferably adapted to be used in connection with a tank that is supplied with water under pressure from a main. The apparatus which forms the subject matter of the present invention comprises a vertically extending inlet pipe 5, the lower end of which is provided with a union or coupling 6 whereby the pipe is connected by any suitable pipe section to the bottom of the water tank so as to be supplied with the coldest water therein. By having the inlet pipe 5 extend vertically, a goose neck or drop is provided which insures the proper and desired circulating action of the cold water through the heating apparatus. The upper end of said pipe 5 is connected to an L-fitting 7 by a screw connection 8. A horizontal discharge or distributor pipe 9 has one end thereof provided with a male screw thread 10 which operates to connect said pipe to the upper end of the L-fitting 7. An elongated circulating pipe 11 has one end thereof positioned around the inner or discharge end of the pipe 9. This circulating pipe is substantially larger in diameter than the distributor pipe 9 and is arranged so that the latter rests upon the bottom thereof as shown in Figures 1 and 3. By positioning the pipe 11 in this manner, the top is spaced from the upper portion of the discharge pipe 9 and forms with the latter a conduit or passageway 12 through which the cold water passes to an outlet pipe 13. The end of the pipe 9 that extends into or is enclosed by the circulating pipe 11 is cut angularly as at 14 so as to form a nozzle which operates to direct the water toward the bottom of the pipe 11 as shown by the arrows in Figure 1. In forming the discharge nozzle on the distributor pipe 9, the cut is preferably made at an angle of approximately 30° and so that the upper portion of said pipe 9 extends or overhangs, the bottom portion. A characteristic and an advantage of forming the nozzle in this manner is that no auxiliary or supplemental water directing means is necessary in the fabrication of the apparatus. The cold water from the inlet pipe 5 flows to the outer end of the pipe 11 along the bottom and then is deflected upwards and flows in the opposite or reverse direction along the top of said pipe to the conduit or passageway 12. The water flows through this conduit to the outlet pipe 13. During the aforementioned circulatory movement, the water is heated as

hereinafter described. The outer end of the circulating pipe 11 is connected by a screw connection 15 to a coupling 16. The outer end of this coupling has a plug 17 removably connected thereto by a screw connection 18. When the plug 17 is removed, access may be had to the interior of the circulating pipe 11 for inspection and cleaning purposes. The plug 17 is provided with a polygonal head 19 whereby a wrench or similar turning tool, may be applied. The lower end of the outlet pipe 13 is connected to the central branch of a T-fitting 20. One of the end branches of this fitting is secured to a screw thread 21 on the inner end of the circulating pipe 11. The other end branch of the fitting 20 is secured to a nipple 22 which forms a continuation of the circulating pipe 11. The end of this nipple is connected to the female thread of a coupling 24. The latter is provided with an eccentric boss 25 through which the outer or connected end of the distributor pipe 9 extends. A bushing 26 is interposed between the screw thread 10 on said pipe 9 and a female thread which is formed in the boss 25. This bushing forms a closure for the nipple 22 and operates in conjunction with the boss of the coupling 24 to properly position the distributor pipe 9 at the bottom of the circulating pipe 11. The upper end of the pipe 13 is provided with a union or coupling 27 whereby said pipe is connected to the top or side of the water supply tank. Packing of any suitable character is inserted between the bushing 26 and the upper end of the fitting 7 to prevent any water leakage around the screw thread 10.

The circulating pipe 11 is disposed within a pipe or casing 28 which is substantially larger in diameter than the circulating pipe and forms therewith a jacket 29. A heating medium such as hot water or steam is circulated through this jacket so as to heat the cold water from the supply tank as it circulates through the pipes 9 and 11. The medium referred to is supplied to the jacket 29 by means of a vertically extending pipe 30 which, if desired and convenient, is connected to the water jacket of a steam boiler or similar hot water supply system. The lower end of the pipe 30 is connected to the central branch of a T-fitting 31. One end branch of this fitting is connected by a screw thread connection 32 to the inlet end of the casing 28 and the other end branch is closed by a bushing 33 which is mounted on and is secured to the screw thread 21 on the inner end of the circulating pipe 11. The bushing 33 operates to support and position the circulating pipe 11 with respect to the pipe 28. By arranging the inlet pipe 30 of the hot water supply so that it is connected to the inner end of the circulating pipe 11 and is positioned in close proximity to the outlet pipe 13, the water leaving the circulating pipe receives the maximum amount of heat and consequently is the hottest. Obviously, this is of advantage inasmuch as the hottest portion of the heating medium is associated with and gives the final heating action to the water circulating back into the supply tank. Packing material is inserted between the bushing 33 and the T-fitting 20 to prevent leakage around the inner end of the circulating pipe. The exposed part of the bushing 33 is provided with a head 33ª for turning purposes.

The hot water circulated through the water jacket 28 is discharged and returned to the source of supply through an outlet pipe 34. The latter is connected to the central branch of a T-fitting 35. One of the end branches of this fitting is connected by a screw thread connection 36 to the outer end of the pipe 28. The other end branch of the fitting is closed by a removable plug 37. A head 38 is formed on the outer face of this plug for use in turning the plug into place. When the plug 37 is removed, access may be had to the water jacket 29. The coupling 16 is positioned within the T-fitting 35 as shown in Figure 1 and a leg 39 is connected thereto. This leg operates to support the distal end of the circulating pipe 11 in concentric relation with respect to the casing.

The operation of the apparatus will be as follows. The cold water at the bottom of the water supply tank will be forced by virtue of its pressure through the inlet pipe 5 and into the distributing pipe 9 where it is subjected to the action of the nozzle end and is caused to flow along the bottom of the circulating pipe 11. During this travel or flow, the cold water is heated by the hot water which circulates through the water jacket 29. As the cold water reaches the end of the pipe 11, it is deflected upwardly by the plug 17 and then returns along the top of said pipe to the passageway 12 through which it flows to the outlet pipe 13 and thence to the supply tank. When it is desired to remove the discharge pipe 9 and the circulating pipe 11 for repair or replacement purposes, the unions 6 and 27 are uncoupled and the bushing 33 is removed from the T-fitting 31. This frees said two pipes and permits them to be withdrawn longitudinally from the inlet end of the casing or pipe 28. In the event that it is desired to remove the discharge pipe only, the union 6 is uncoupled and the bushing 26 is withdrawn. This frees the discharge pipe so that it may be withdrawn lengthwise through the eccentric coupling 24 and the nipple 22. When it is desired to clean the pipes 9, 11 and 28, the plugs 17 and 37 are removed.

The water heating apparatus disclosed herein is extremely simple and consists only

of standard pipes, fittings, couplings and plugs. It may be readily assembled and utilizes no bolts or other securing means whatsoever.

The invention is not to be understood as limited or restricted to the specific details set forth since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a water heating apparatus of the character described, the combination of a pipe-element having one end thereof connected to receive cold water from a source of supply, a pipe having one end thereof closed and the other end extending around the other end of the pipe-element and forming therewith a conduit through which the water flows after circulating to the said one end of the pipe and back, an outlet pipe connected to receive the water from the conduit, means forming a jacket around said circulating pipe, and means comprising an inlet and an outlet pipe for circulating a heating medium through the jacket.

2. In a water heating apparatus of the character described, the combination of a horizontal pipe-element having one end thereof connected to receive cold water from a source of supply, a horizontal pipe having one end thereof closed and the other end extending around the other end of the pipe-element and forming therewith a conduit through which the water flows after circulating to the said one end of the pipe and back, an outlet pipe connected to receive the water from the conduit, a tubular casing forming a jacket around said circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of the casing, respectively, for circulating a heating medium through the jacket.

3. In a water heating apparatus of the character described, the combination of a pipe-element having one end thereof connected to receive cold water from a source of supply, the other end of the pipe-element having means forming a discharge nozzle, a pipe having one end thereof closed and the other end extending around the said other end of the pipe-element and forming therewith a conduit, the discharge nozzle being arranged to cause the cold water to circulate to the said one end of the pipe and then back and through the conduit, an outlet pipe connected to receive the water from said conduit, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

4. In a water heating apparatus of the character described, the combination of a horizontal pipe-element having one end thereof connected to receive cold water from a source of supply, the other end of the pipe-element being cut angularly to form a discharge nozzle, a horizontal pipe having one end thereof closed and the other end extending around the said other end of the pipe-element and forming therewith a conduit, the pipe being arranged so that the discharge nozzle is operative to cause the cold water to circulate along the bottom of the pipe in one direction and thence backwardly along the top and through the conduit, an outlet pipe connected to receive the water from said conduit, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

5. In a water heating apparatus, the combination of a pipe-element having one end thereof connected to receive cold water from a source of supply, a pipe having one end thereof closed and the other end extending around the other end of the pipe-element and forming therewith, a conduit through which the cold water flows after circulating to the said one end of the pipe and back, means for supporting the pipe-element in eccentric relation with respect to the circulating pipe, an outlet pipe connected to the said other end of the circulating pipe, for receiving the circulated water from the conduit, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

6. In a water heating apparatus, the combination of a horizontal pipe-element having one end thereof connected to receive cold water from a source of supply, a horizontal pipe having one end thereof closed and the other end extending around the other end of the pipe-element and forming therewith a conduit through which the cold water flows after circulating to the said one end of the pipe and back, means connected to the circulating pipe for supporting the pipe-element in eccentric relation therewith, an outlet pipe connected to the said other end of the circulating pipe and adapted to receive the circulated water from the conduit, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

7. In a water heating apparatus of the character described, the combination of a horizontal pipe-element having one end thereof connected to receive cold water from a source of supply, a horizontal pipe having one end thereof closed and the other end

extending around the other end of the pipe-element and forming therewith a conduit through which the water flows after circulating to the said one end of the pipe and back, the pipe-element being positioned at the bottom of and eccentrically with respect to the circulating pipe, a coupling connected to the said other end of the circulating pipe and embodying means forming an eccentric opening through which the said one end of the pipe-element extends, an outlet pipe for receiving the water from the conduit, said outlet pipe being connected to the said other end of the circulating pipe, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

8. In a water heating apparatus of the character described, the combination of a horizontal pipe-element having one end thereof connected to receive cold water from a source of supply, a horizontal pipe having one end thereof closed and the other end extending around the other end of the pipe element and forming therewith a conduit through which the water flows after circulating to the said one end of the pipe and back, the pipe element being positioned at the bottom of and eccentrically with respect to the circulating pipe, a coupling connected to the said other end of the circulating pipe and provided with a bushing having formed therein an eccentric opening through which the said one end of the pipe-element extends, an outlet pipe for receiving the water from the conduit, said outlet pipe being connected to the said other end of the circulating pipe, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

9. In a water heating apparatus of the character described, the combination of a pipe-element having one end thereof provided with a screw thread and connected to receive cold water from a source of supply, a pipe having one end thereof closed and the other end extending around the other end of the pipe-element and forming therewith a conduit through which the water flows after circulating to the said one end of the pipe and back, a coupling connected to the said other end of the circulating pipe and provided with means secured to the screw thread on the pipe-element for supporting the pipe element in fixed relation with respect to the circulating pipe, an outlet pipe for receiving the water from the conduit, said outlet pipe being connected to the said other end of the circulating pipe, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

10. In a water heating apparatus of the character described, the combination of a pipe-element having one end thereof provided with a screw thread and connected to receive cold water from a source of supply, a pipe having one end thereof closed and the other end extending around the other end of the pipe-element and forming therewith a conduit through which the water flows after circulating to the said one end of the pipe and back, a coupling connected to the said other end of the circulating pipe and provided with means secured to the screw thread on the pipe-element for supporting the pipe-element eccentrically with respect to the circulating pipe, an outlet pipe for receiving the water from the conduit, said outlet pipe being connected to the said other end of the circulating pipe, a casing forming a jacket around the circulating pipe, and an inlet pipe and an outlet pipe connected to the ends of said casing respectively, for circulating a heating medium through the jacket.

11. In a water heating apparatus of the character described, the combination of a pipe-element having one end thereof connected to receive cold water from a source of supply, a pipe having one end thereof closed, the other end of said pipe being provided with a screw thread and extending around the other end of the pipe-element so as to form therewith a conduit through which the cold water flows after circulating to the said one end of the pipe and back, a T-fitting having one end branch thereof connected to the screw thread at the said other end of the circulating pipe, a nipple extending around the said one end of the pipe-element and having one end thereof connected to the other branch of the belting, a coupling connected to the other end of the nipple and provided with means closing the said other end of the circulating pipe and for supporting the pipe-element, a casing forming a jacket around the circulating pipe, and means for circulating a heating medium through the jacket.

12. In a water heating apparatus, the combination of a pipe-element having one end thereof connected to receive cold water forming a source of supply, a pipe having one end thereof closed, the other end of said pipe being provided with a screw thread and extending around the other end of the pipe-element so as to form therewith a conduit through which the cold water flows after circulating to the said one end of the pipe and back, an outlet pipe connected to receive the water from the conduit, a tubular casing forming a jacket around the circulating pipe, a T-fitting connected to one end of

the casing and having a bushing secured to the screw thread at the said other end of the circulating pipe, and means for circulating a heating medium through the jacket comprising an inlet pipe connected to the T-fitting and an outlet pipe connected to the other end of the casing.

13. In a water heating apparatus, the combination of a pipe element having one end thereof connected to receive cold water forming a source of supply, a pipe having one end thereof closed, the other end of said pipe being provided with a screw thread and extending around the other end of the pipe element so as to form therewith a conduit through which the cold water flows after circulating to the said one end of the pipe and back, an outlet pipe connected to receive the water from the conduit, a tubular casing forming a jacket around the circulating pipe, a T-fitting connected to one end of the casing and having a removable bushing secured to the screw thread at the said other end of the circulating pipe, and means for circulating a heating medium through the jacket comprising an inlet pipe connected to the T-fitting and an outlet pipe connected to the other end of the casing.

14. In a water heating apparatus of the character described, the combination of a pipe-element having one end connected to receive cold water forming a source of supply, a pipe having at one end thereof a coupling with a removable plug, the other end of the pipe extending around the other end of the pipe-element and forming therewith a conduit through which the cold water flows after circulating to the other end of said pipe and back, an outlet pipe for receiving the water from the conduit, said outlet pipe being connected to the said other end of the circulating pipe, a tubular casing forming a jacket around said circulating pipe, and means for circulating a heating medium through the jacket comprising an inlet pipe and an outlet pipe connected to the ends of the casing respectively.

15. In a water heating apparatus of the character described, the combination of a pipe-element having one end connected to receive cold water forming a source of supply, a pipe having at one end thereof a coupling with a removable plug, the other end of the pipe extending around the other end of the pipe-element and forming therewith a conduit through which the cold water flows after circulating to the other end of said pipe and back, an outlet pipe for receiving the water from the conduit, said outlet pipe being connected to the said other end of the circulating pipe, a tubular casing extending around said circulating pipe and provided with a T-fitting at one end thereof, a plug removably connected to one branch of the fitting, and means for circulating a heating medium through the jacket comprising an inlet pipe and an outlet pipe connected to one of the other branches of the fitting.

Signed at Chicago, Illinois, this 16th day of May, 1928.

DAVID F. GARVEY.