Dec. 29, 1936. C. F. KEIRLE 2,065,708

WATER HEATER

Filed May 3, 1934 2 Sheets-Sheet 1

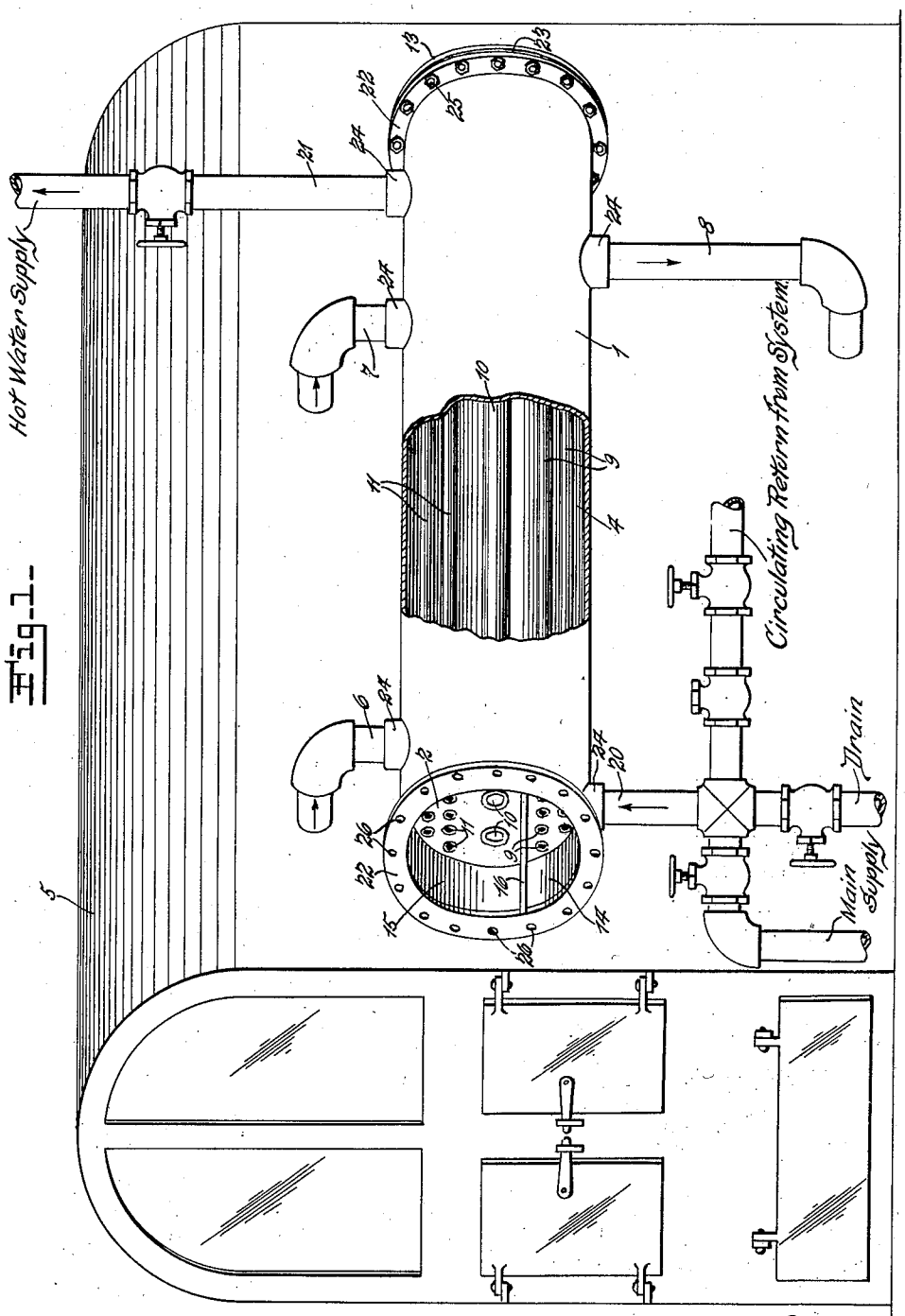


Fig. 1.

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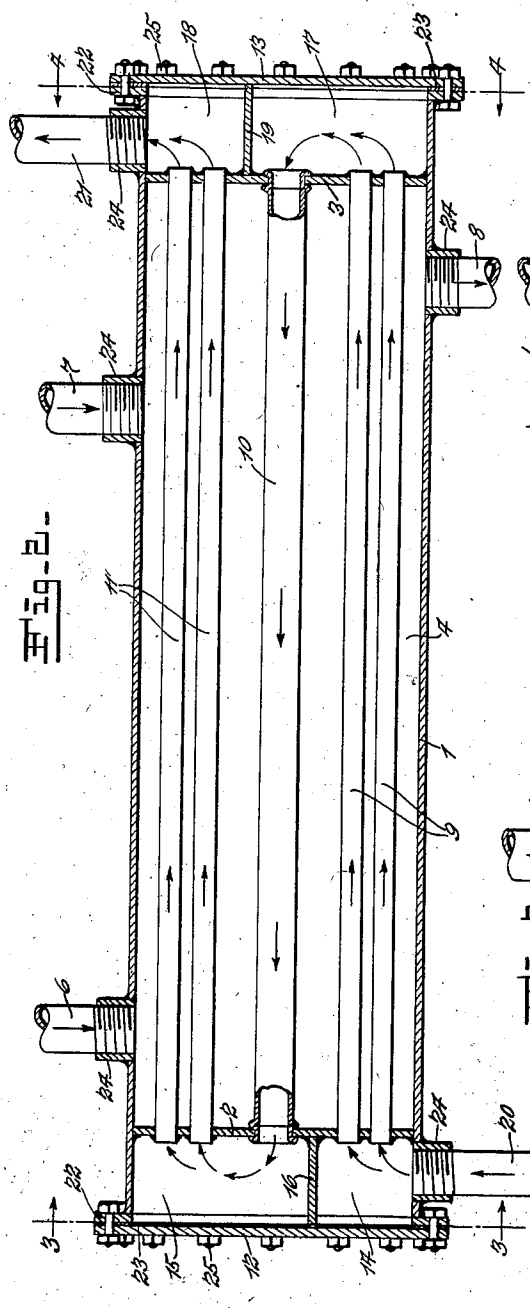


Fig. 2.

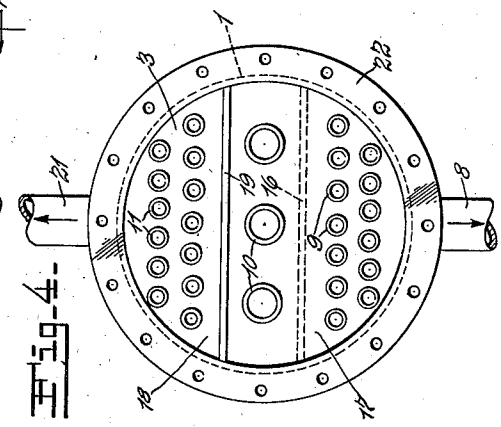


Fig. 4.

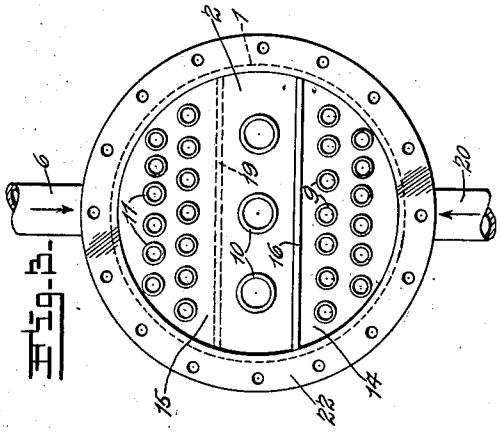


Fig. 5.

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UNITED STATES PATENT OFFICE

2,065,708

WATER HEATER

Charles F. Keirle, St. Louis, Mo.

Application May 3, 1934, Serial No. 723,652

1 Claim. (Cl. 257—240)

This invention relates to a heat exchanger particularly adapted for providing a hot water supply in residences, apartments, hotels and the like, in conjunction with a boiler of the heating system.

An object of this invention is to provide a device of this character which is economical to construct, durable in service, easy of maintenance, and efficient in operation.

Another object of the invention is to provide in such a device means by which several streams of water passing through separate tubes of the heater may be mixed and remixed to secure a maximum heat exchange.

Further objects will be apparent from the following detail description taken in connection with the accompanying drawings, in which—

Fig. 1 is a perspective view of the device partly in section and with the cover plate removed showing the device connected in a system in which it is adapted to operate;

Fig. 2 is a longitudinal vertical section through the device;

Fig. 3 is a section on line 3—3, Fig. 2; and

Fig. 4 is a section on line 4—4, Fig. 2.

In its general construction the heater comprises a cylindrical shell with tube plates at each end spaced from cover or end plates respectively. Connections are made with the boiler to provide hot water for heat exchange about tubes which have their ends secured in the tube plates and communicate with the spaces between the tube plates and end plates. A baffle is provided to divide each of the end spaces into separate chambers. An inlet and an outlet is provided for the chambers in such a manner that water must traverse the heater three times.

More specifically and in accordance with the preferred construction shown in the accompanying drawings, a cylinder or casing 1 is divided by tube plates 2 and 3 each spaced from the end of the casing. The chamber between the tube plates, designated as 4, is in the central part of the cylinder and is provided with circulating hot water from a boiler 5, through inlet pipes 6 and 7 and a return pipe 8.

A series of tubes 9, a series of tubes 10, and a series of tubes 11 have their ends secured to the tube plates 2 and 3 and traverse the chamber 4.

A chamber is formed at the end of the casing adjacent the tube plate 2 by an end plate 12 and a similar chamber is formed adjacent the tube plate 3 by an end plate 13. The chamber between the tube plate 2 and cover plate 12 is divided into two compartments 14 and 15, by a baffle 16, positioned between the ends of the tubes 9 and the ends of the tubes 10. The chamber between the tube plate 3 and the end plate 13 is divided into two compartments 17 and 18 by a baffle plate 19 positioned between the ends of the tubes 10 and the ends of the tubes 11.

An inlet pipe 20 for the water to be heated is connected into the compartment 14 and an outlet pipe 21 for the heated water is connected into the compartment 18.

The tubes 9 and 11 are preferably of much smaller diameter than the second series of tubes 10. Thus, when water enters the heater through the pipe 20 and passes into the chamber 14 it is conducted therefrom by the series of small tubes 9 to the chamber 17, whence it is mixed and passes into the larger tubes 10 in its second path through the heater. Then the water is conducted into the compartment 16 where it is broken up in order to be conducted through the series of smaller tubes 11 to the last compartment 18, connected with the outlet pipe 21. The fact that the water is completely mixed in the compartment 17 and again separated in the compartment 15 adds efficiency to the device and increases the amount of heat exchange over a similar device where the same size tubes are used throughout.

In the actual construction of the device the tube plates 2 and 3 are cut to the approximate inside diameter of the cylindrical shell or casing 1. The tubes are then assembled with the plates 2 and 3, the ends of the tubes being attached to the plates either by expanding them or by brazing. The assembly comprising the tubes and plates are then inserted in the shell and the plates are welded to the inside surface of the casing. Rings 22 are cut to the diameter of the casing 1, are welded to it thereby forming attaching flanges for the cover plates 12 and 13 respectively. The baffle plates 16 and 19 are inserted in their proper position and welded to the inside surface of the casing 1 and to the tube plates 2 and 3 respectively. They are so constructed and positioned that the outer edge of each of them is flush with the adjacent flange 22. Each of the cover plates 12 and 13, which are flat circular plates, has a gasket 23 which forms a seal between the cover plate and the flange, as well as between the cover plate and the outer edge of the baffle plate.

Thimbles 24, to form connections with the pipes 6, 7, 8, 20 and 21, are inserted in holes cut in the casing 1 and welded thereto.

The plates 12 and 13 are attached to the flanges

22 respectively by bolts 25 which pass through appropriate holes in the cover plates adapted to register with holes 26 in the flanges.

It will be obvious from the foregoing description that the device lends itself to economical construction. Stock flat steel may be used throughout and the entire device fabricated by the use of simple equipment in a quick and efficient manner. Plain circular packing gaskets only are required and the cover plates may be readily removed for cleaning the tubes as required.

Various changes may be made in the details of construction, within the scope of the appended claim, without departing from the spirit of this invention.

I claim:

In a water heater, a central chamber, a series of relatively small tubes traversing the chamber open to an inlet compartment at one end of the chamber and open to an intermediate compartment at the other, a series of relatively large tubes traversing said chamber, communicating said intermediate compartment with an intermediate compartment at the first end of the chamber, and a second series of relatively small tubes traversing said chamber communicating the last named compartment with an outlet compartment at said other end.

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