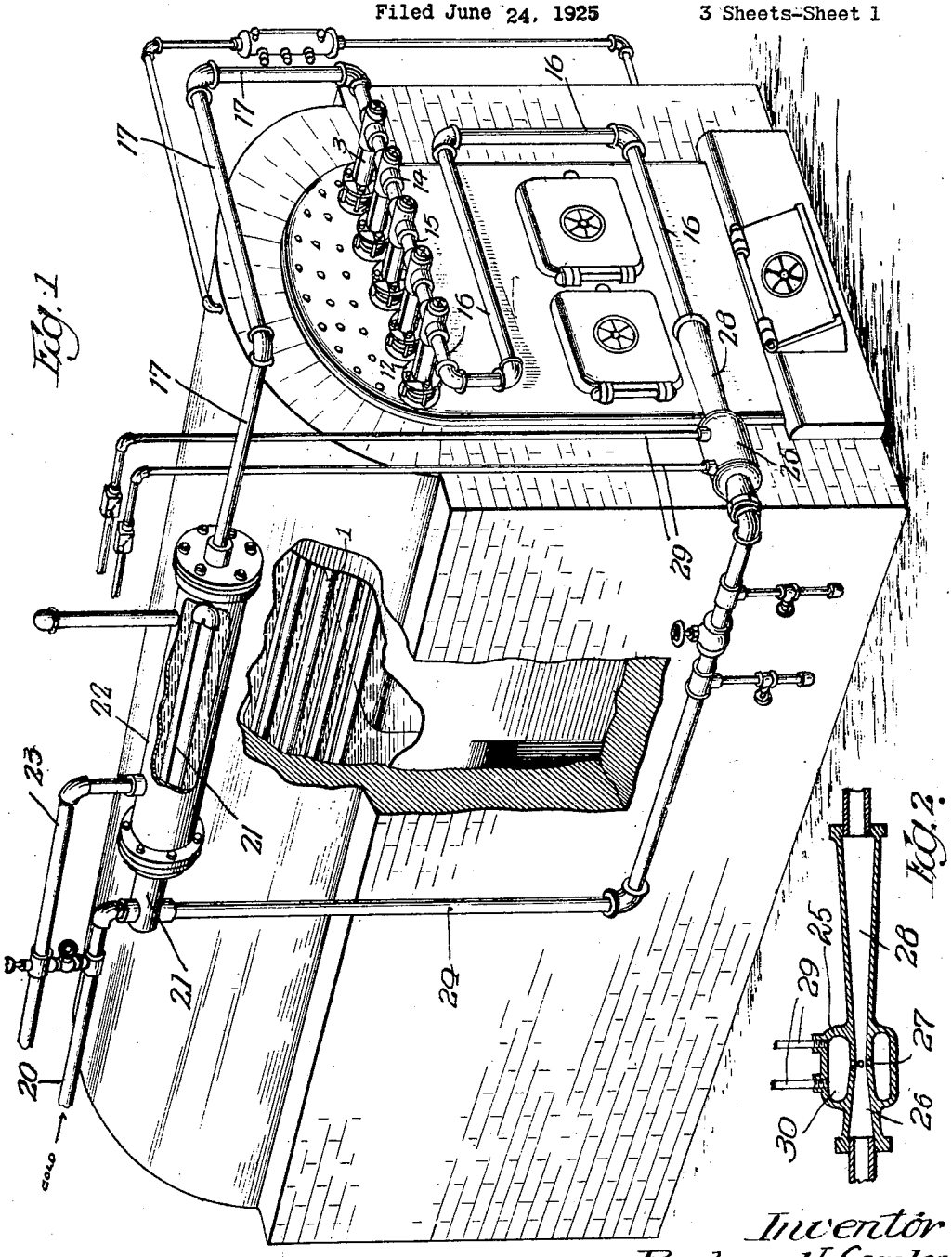
Dec. 6, 1927. 1,651,692

R. L. GEASLEN

WATER HEATING APPARATUS

Filed June 24, 1925 3 Sheets-Sheet 1



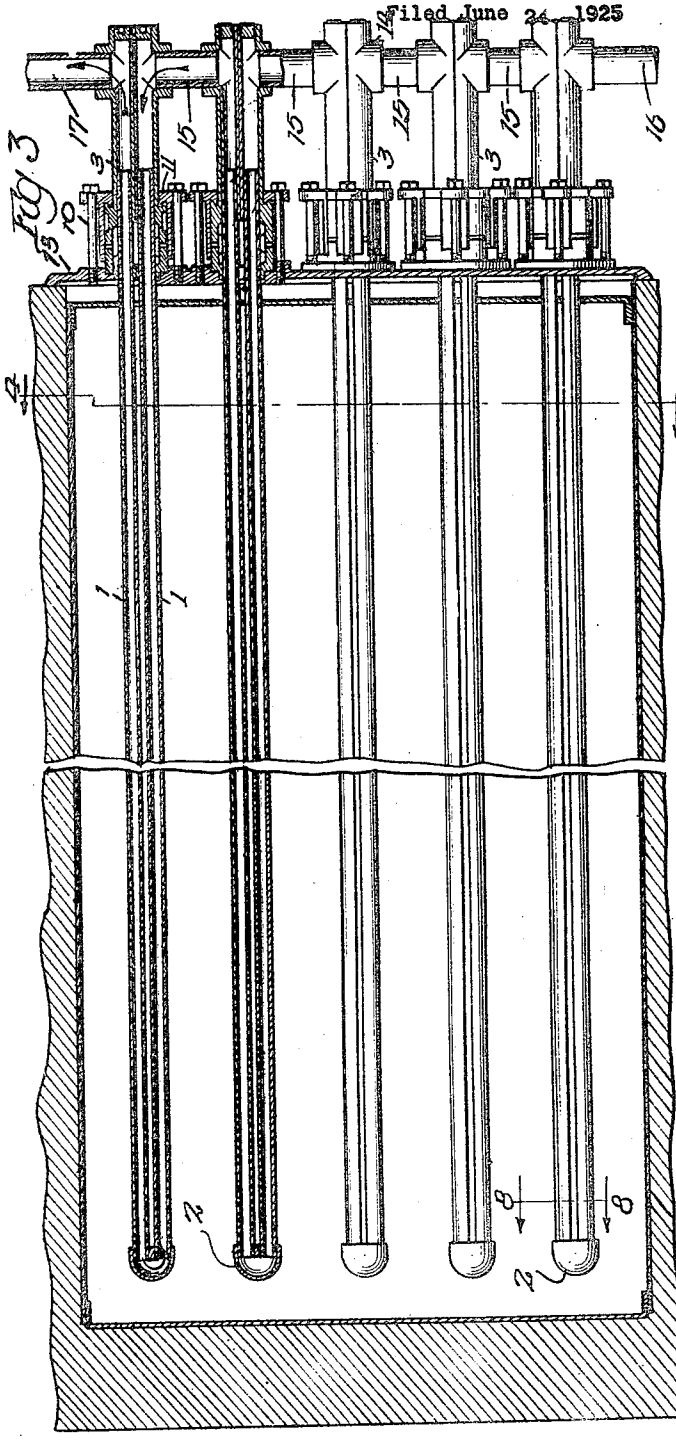
Inventor
Richard L. Geaslen
By. Arthur F. Durand
Atty.

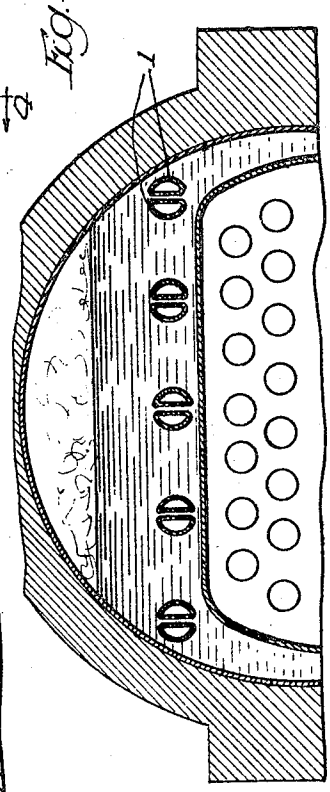
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R. L. GEASLEN

WATER HEATING APPARATUS

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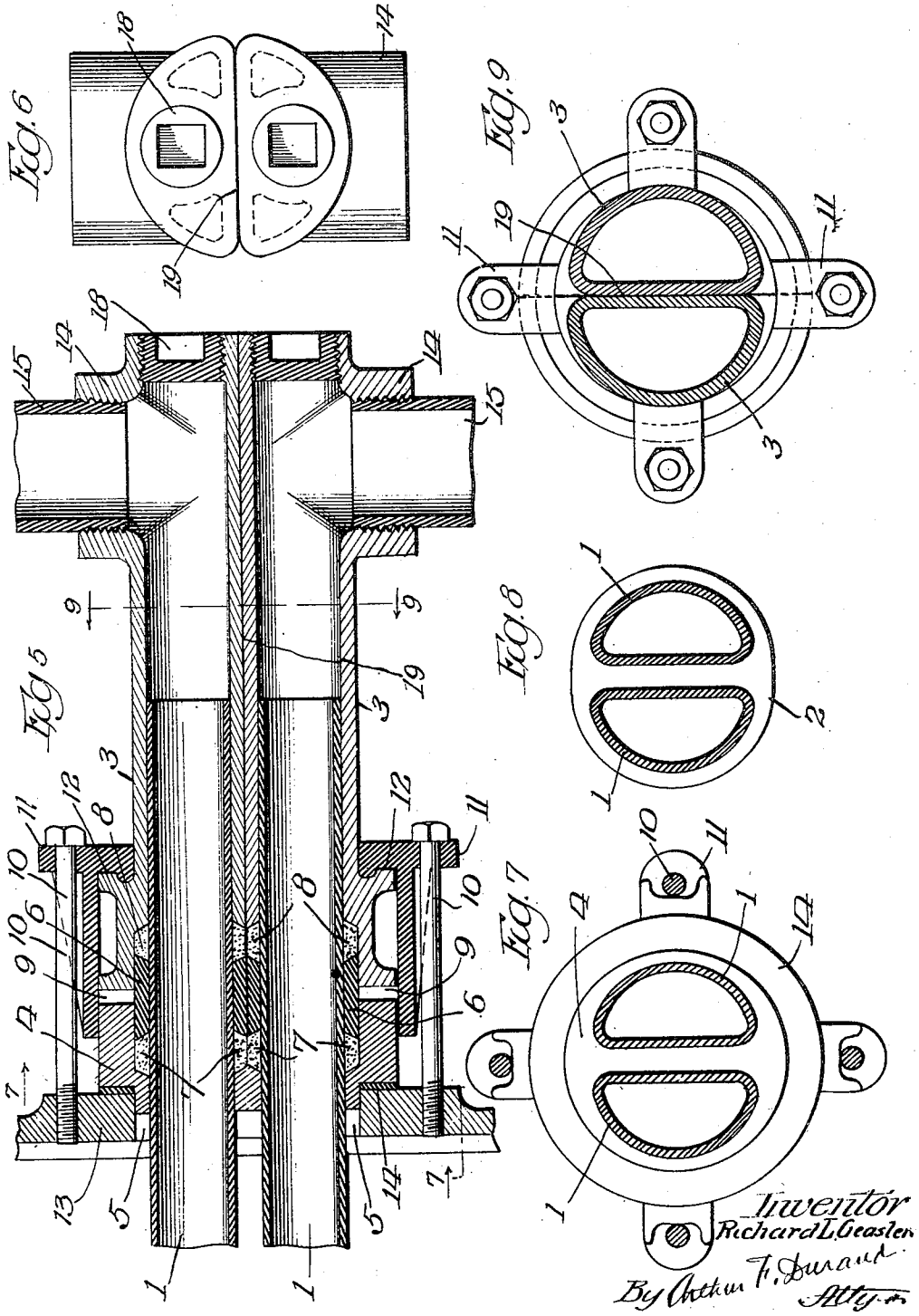
Inventor
Richard L. Geaslen
By Arthur T. Jurave
Atty.

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R. L. GEASLEN

WATER HEATING APPARATUS

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UNITED STATES PATENT OFFICE.

RICHARD L. GEASLEN, OF CHICAGO, ILLINOIS.

WATER-HEATING APPARATUS.

Application filed June 24, 1925. Serial No. 39,204.

This invention relates to water heating apparatus in general, but more particularly to water heating attachments for boilers, of the kind in which the heating units are inserted through the front plate of the boiler and are immersed in the body of hot water therein, whereby water under pressure from the ordinary mains or other source of supply, when taken through said heating units, will be heated in the desired manner, and may thereafter be drawn off through the faucets in kitchens and bathrooms, or in other places, for ordinary domestic use, or for any desired purpose.

Generally stated, the object of the invention is to provide a novel and improved water heating attachment of the foregoing general character, which can be easily attached to an ordinary boiler, and which will efficiently heat the water in the desired manner.

Another object is to provide an improved construction and arrangement whereby the tubes of the heating units can be easily cleaned, from the front of the boiler, without moving or disturbing any of the tubes of said units.

Another object is to provide an improved construction and arrangement whereby the incoming cold water, for each unit, will not tend to chill the outgoing hot water, thereby tending to insure a supply of hot water of a temperature equal to that of the body of water carried within the boiler.

Another object is to provide an improved construction and arrangement whereby the water is circulated in the heating system, and whereby the return water, being of higher temperature than the fresh water taken from the main supply under pressure, is mingled with the cold water from said main supply, thereby pre-heating the water before it enters the heating units which are immersed in the body of hot water contained in the boiler.

Another object is to provide a novel and improved construction whereby the outgoing hot water from the heating units of the attachment is employed to pre-heat the incoming water under pressure from the main supply, by a novel construction of pre-heater, whereby the water will be insured a higher temperature before it enters the series of heating units through which it must pass in order to be brought up to the same temperature, or substantially the same temperature, as that of the body of water contained in the boiler.

Another object is to provide a novel and improved construction whereby to insure an increased area of heating surface for the heating units.

It is also an object to provide certain details and features of construction, and combinations tending to increase the general efficiency and the desirability of a water heating attachment of this particular character.

To the foregoing and other useful ends, the invention consists in the matters hereinafter set forth and claimed, and shown in the accompanying drawings, in which,—

Fig. 1 is a perspective of an ordinary boiler equipped with a water heating attachment embodying the principles of the invention.

Fig. 2 is a detail section, on a larger scale, of the Venturi tube pre-heater employed in the construction shown in Fig. 1.

Fig. 3 is a horizontal section of the boiler, on a larger scale, showing two of the heating units in longitudinal horizontal section, and showing certain portions broken away for convenience of illustration.

Fig. 4 is a transverse section on line 4—4 in Fig. 3.

Fig. 5 is an enlarged horizontal section of the outer portion of one of the heating units.

Fig. 6 is an end view of the said outside portion of said heating unit.

Fig. 7 is a transverse section on line 7—7 in Fig. 5.

Fig. 8 is an enlarged transverse section on line 8—8, through one of the heating units.

Fig. 9 is a transverse section on line 9—9 in Fig. 5.

As thus illustrated, and referring to Figs. 3 and 5, it will be seen that each heating unit comprises a pair of parallel pipes 1, 1, flattened on their opposing sides, so that each pipe is practically half round in cross section. The two pipes, thus spaced a distance apart to permit the entrance of water between them, are connected together at their inner ends by means of a cap 2 of any suitable character, so that water may flow from one tube into the other. The outer ends of said tubes are telescoped within the complemental castings 3 and 3, which latter are flat on their opposing sides and are quite close together. A ring collar 4 is fitted within the opening 5 formed in the front of the

boiler, and sleeves or gaskets 6 are fitted over the pipes 1, as shown, within the outer portion of the collar 4, so that spaces 7 are formed, which are filled with packing to form stuffing boxes. The castings 3 are formed with similar spaces 8, at the outer ends of the sleeves 6, and these spaces are filled with packing, thus forming another stuffing box. It will be seen that the sleeves 6 cover the cap 9 formed between the outer end of the ring 4 and the adjacent ends of the castings 3, whereby the double stuffing box thus formed may be tightened by the bolts 10, which are inserted through the hook brackets 11, which detachably engage the shoulders 12 on the castings 3, and which are threaded into the front 13 of the boiler. A ring packing 14 or gasket is interposed between the ring 4 and the front plate 13 of the boiler, to form a tight joint to prevent leakage of the body of water contained in the boiler. The outer end portions of the sleeve-like castings 3 are provided with lateral bosses 14, and pipes 15 are screwed into these bosses, whereby these pipes 15 connect the heating units in series in the manner shown in Fig. 3 of the drawings. The pipe 16 is the intake pipe for the series of heating units, while the pipe 17 is the offtake or outlet pipe for said series of heating units.

Thus it will be seen that each pipe 1 is completely surrounded by the water of the boiler, so that all sides of each pipe provide a heating area therefor. The incoming water of each unit is spaced a distance from the outgoing water of the same unit, and the hot water in the boiler is interposed between the two tubes of each heating unit, so that the incoming water will not tend to cool the outgoing water, and a greater heating area or surface is thereby insured for each heating unit, but at the same time each heating unit is compact and convenient in form.

Furthermore, by providing the outer ends of the castings 3 with screw plugs 18, in alignment with the tubes 1, as shown more clearly in Fig. 5, the said tubes can be cleaned without disturbing them or removing them from the apparatus. In other words, all that is necessary, in order to clean the heating units, is to remove the plugs 18 and insert some kind of a cleaning device into the tubes, in a manner that will be readily understood.

If desired, insulation 19, such as asbestos or any other suitable heat insulating material, can be interposed between the two castings 3 of each unit, thereby to prevent the water which enters one casting from absorbing heat from the water which is escaping from the other casting of the same pair.

Also, in case of any necessary repairs or inspection, the bolts 10 can be unscrewed, thereby permitting the hook brackets 11 to be detached from the collar-like shoulder 12 for the castings 3, thus permitting the castings 3 to be removed very easily and readily, and one casting can obviously be removed without disturbing the other, as the two castings are each separately formed. In this connection, it will be readily understood that the bolts 10 and hook brackets 11 can be arranged in any suitable manner, and can be of any suitable or desired number.

Now referring to Fig. 1, it will be seen that the cold water pipe 20 leads to a heating unit 21 composed of pipes and other elements exactly like the heating elements shown in Figs. 3 and 5 of the drawings. This heating element is inserted through one end of a drum 22, which receives the hot water from the pipe 17 previously mentioned. The hot water thus conducted through said drum escapes through a pipe 23, and is from the latter taken to the kitchen or bathroom and to the hot water fixtures thereof, or to other places where the hot water is to be used. The cold water from the pipe 20, after passing through the heating unit 21, and after being heated by the outgoing water from the heating attachment, flows through the pipe 24 to the Venturi tube pre-heater 25, which latter is shown in section in Fig. 2 of the drawings. Thus the water enters the Venturi tube device through the gradually reduced portion 26, passes the lateral openings 27, and escapes to the gradually expanding or increasing portion 28, then into the pipe 16 previously mentioned. Now the return pipes 29 of the water circulating system, provided for the return of the water through the heating units of the attachment, are connected to the barrel or cylindrical outer chamber 29 of the said Venturi tube device, as shown, so that the return water of the heating and circulating system is discharged into the chamber 30 of said device. Therefore, when any water is drawn off from the system, through the faucets of the bathroom or kitchen, or other places, reducing the pressure in the system, the main supply pressure then immediately is exerted in the tube 24 which leads to the portion 26 previously mentioned, so that the water is discharged from the portion 26 to the portion 28, past the openings 27, thereby drawing in some of the heated water which has returned through the pipes 29 previously mentioned. Thus the return water of the circulating system is mingled with the water from the pre-heater 21, whenever a hot water faucet is opened anywhere, thus producing a forced circulation each time water is drawn off from the system. Of course, while no water is being drawn off, the water will circulate slowly in the ordinary way through the heating units of the heating attachment, upwardly through the piping 17, and then through the drum or cylinder 22 and out

through the pipe 23 to the various instrumentalities of the system (not shown), and then finally back through the pipes 29 which lead to the Venturi pre-heater. Thus the water is pre-heated twice, with the arrangement shown and described, which is illustrative of one form of the invention, before entering the heating units inserted in the boiler, the second time the water is pre-heated. This is accomplished by mingling therewith the returning water of the circulating system, and thereby setting up a forced circulation in the system in a manner that will be readily understood. Thus the water will circulate in the ordinary way, while no water is being drawn off from the system, but the minute a faucet is opened anywhere, to draw off hot water, an accelerated circulation is produced in the entire circulating system, and through the heating units thereof in the boiler.

Thus it will be seen that a hot water attachment is provided for ordinary boilers, which may be easily installed and easily inspected or repaired afterward, and which will efficiently circulate and heat the water. By boilers is meant any receptacle or tank in which water is heated or in which hot water is maintained. Of course, the water may be drawn directly from the system, as the area of heating surface of the heating units is sufficient to heat the water constantly when the body of water in the boiler is maintained at the necessary temperature. On the other hand, however, a storage tank (not shown) may be interposed in the system, and the water may be drawn from that in the ordinary and well known manner.

Without any intent to disclaim any novelty over the prior art, shown in the drawings or described in the specification, what I claim as my invention is:

1. In water heating apparatus, a boiler, a heating unit comprising a single pair of parallel straight water tubes inserted through the wall of the boiler and into the body of hot water contained therein, said tubes having outer end portions extending a distance outside the boiler and both tubes being exposed to contact with said body of hot water, inside the boiler, and being spaced apart a uniform distance to prevent loss of heat from the outgoing water to the incoming water, permitting free circulation of the hot water between said tubes, means to connect the inner ends of said tubes together, and comprising instrumentalities entirely outside of the boiler and detachably mounted on the outside thereof for supporting and entirely enclosing said outer end portions of said tubes outside of the boiler and having intake and offtake passages for admitting water into the enclosed and unrestricted outer end of one tube and causing heated water to escape from the enclosed and unrestricted outer end of the other tube, said unit being detachably connected by its said instrumentalities to the boiler, so that by disconnection of said instrumentalities the unit can be detached and pulled out for repairs, and the pair of tubes being endwise removable from said instrumentalities when the unit is removed from the boiler.

2. A structure as specified in claim 1, said tubes having their opposing sides flattened and being spaced apart a distance less than the diameter of each tube, permitting said instrumentalities to entirely enclose the outer end portion of each tube outside of the boiler.

3. A structure as specified in claim 1, said instrumentalities comprising a removable closure means opposite the outer end of each tube, whereby to enter the outer end of either tube for the cleaning of the interior thereof without removing or disturbing either tube, and detachable lateral coupling means intermediate each tube and its allotted closure means.

4. A structure as specified in claim 1, said instrumentalities comprising a pair of separate castings telescoped over the outer ends of said tubes and comprising stuffing box means interposed to prevent leakage from the boiler around the tubes and in position to prevent leakage from between the tubes and said castings, and coupling means to form a tight joint between each tube and its casting, and serving to hold said castings firmly together.

5. A structure as specified in claim 1, said instrumentalities comprising a pair of castings telescoped over the outer end portions of said tubes, flattened on their opposing surfaces, having external shoulders formed thereon, the tubes being similarly flattened on their opposing sides, a ring surrounding the tubes and seated against the outer wall of the boiler, hook brackets engaging said shoulders on the castings, stuffing box means interposed between said ring and said castings, fitting around the outside of said flattened tubes, and bolts connecting said hook brackets with said boiler wall, said stuffing box means comprising sleeves telescoped over said tubes, closing the space between said ring and said castings, which space is contracted by adjustment of said bolts to tighten the stuffing box means.

6. A structure as specified in claim 1, said instrumentalities being provided with removable plugs in the outer end thereof, each plug in alignment with one of said tubes, but spaced a distance therefrom, the two plugs disposed side by side whereby removal of either plug permits access through the inlet or outlet of its allotted tube for cleaning or other purposes.

7. A structure as specified in claim 1, said instrumentalities comprising a separate cast-

ing forming a sleeve over the outer end portion of each tube, and means for anchoring said casting to the front wall of the boiler, together with means to prevent leakage from the boiler to said instrumentalities, and to prevent leakage from said tubes.

8. A structure as specified in claim 1, in combination with one or more similar heating units, the plurality of units thus formed being arranged in a horizontally disposed plane, and connected in series, the supporting instrumentalities of each unit being divided longitudinally into halves, the intake half of one unit being connected with the offtake half of the next unit, whereby the tubes of the different units are all connected in series and each out of contact with the others to permit free circulation of the heating liquid around each tube.

9. In apparatus of the class described, the combination of parallel straight tubes for a passage for fluid, connected together at one end thereof, spaced apart a distance, a pair of separate sleeves telescoped over the tubes at the other end thereof, disposed side by side, one sleeve forming an intake for one tube and the other sleeve forming an offtake for the other tube, a support, and means holding said sleeves rigidly side by side in position on said support, thereby forming a rigid support for each sleeve and its allotted tube.

10. A structure as specified in claim 9, said tube being flattened on their opposing sides, where they are spaced apart, and having unrestricted ends which are removable from said sleeves, the latter being flattened also on their opposing sides.

11. A structure as specified in claim 9, said sleeve holding means comprising parts forming a stuffing box for each tube, said support being the wall of a liquid container, whereby said stuffing box serves to prevent leakage from the container, and to prevent leakage from said tubes and sleeves.

12. A structure as specified in claim 9, said support being a container for hot fluid, whereby to heat the fluid in said tubes, with said supporting means entirely outside of said container.

13. In water heating apparatus, the combination of a boiler having an opening in the wall thereof, a header having two compartments, an inlet for one compartment, and an outlet for the other compartment, a pipe connection extending from one compartment through said opening and into the boiler a distance and then back through said opening to the other compartment, a member interposed between the header and the boiler, and means comprising bolts for driving the header toward the boiler, whereby said member is subject to compression between the header and the boiler, said member having two openings fitting said pipe connection.

14. A structure as specified in claim 13, said inlet and outlet comprising pipes extending transversely of the header, spaced a distance from said member, and said pipe connection forming with said inlet and outlet a passage for the circulation of water to be heated by the body of hot water in the boiler.

15. A structure as specified in claim 13, said member being recessed on its outer face to form a compression seat for means forming a tight joint between the header and said member.

Specification signed this 17th day of June, 1925.

RICHARD L. GEASLEN.