

July 1, 1930.

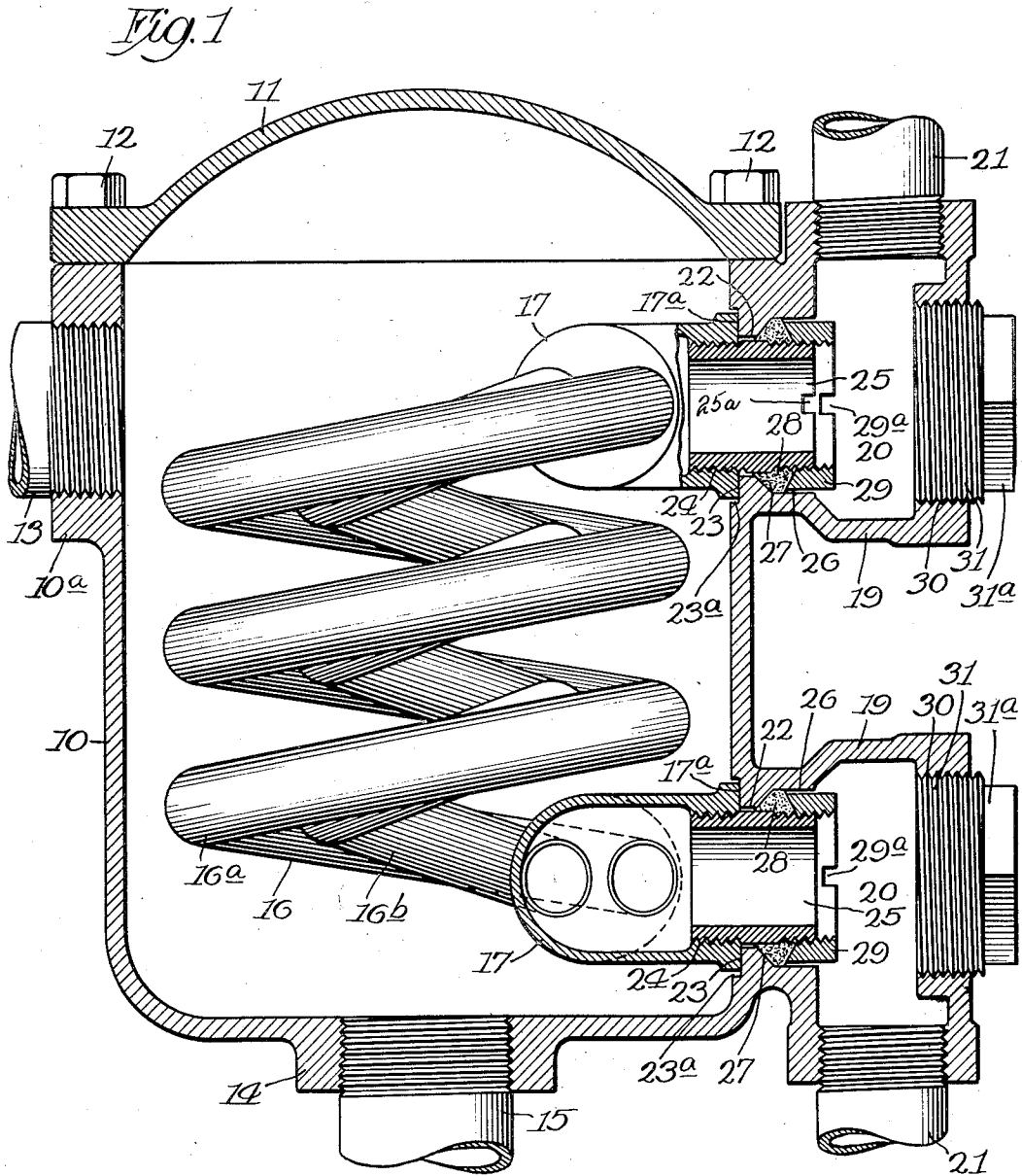
W. A. DALEY

1,769,735

WATER HEATER

Filed Nov. 11, 1927

3 Sheets-Sheet 1



Inventor:
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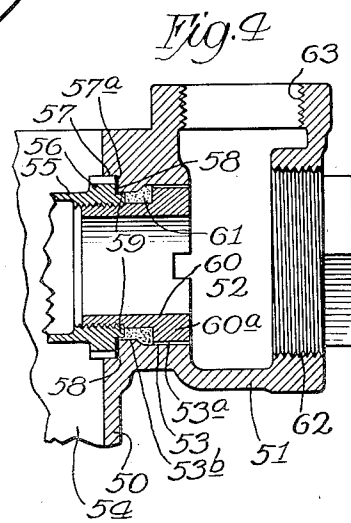
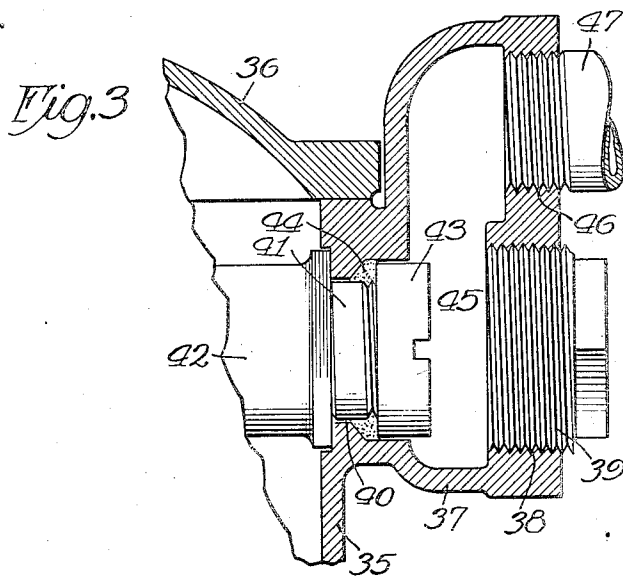
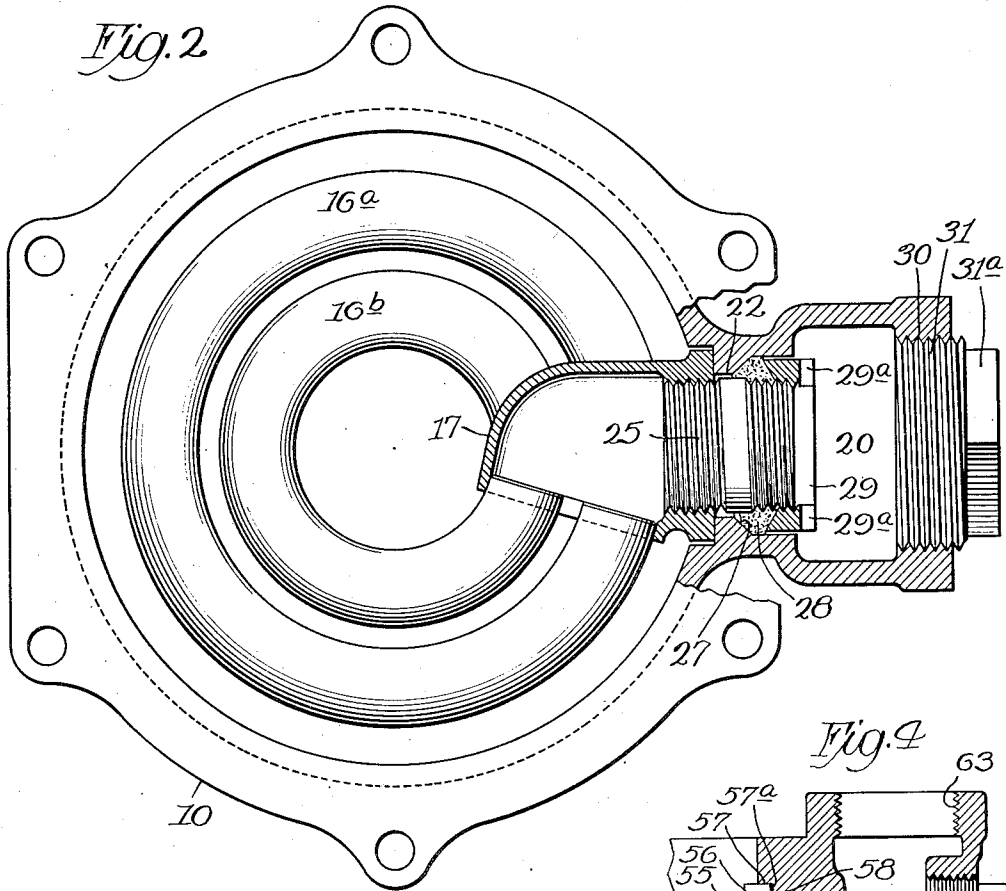
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3 Sheets-Sheet 2



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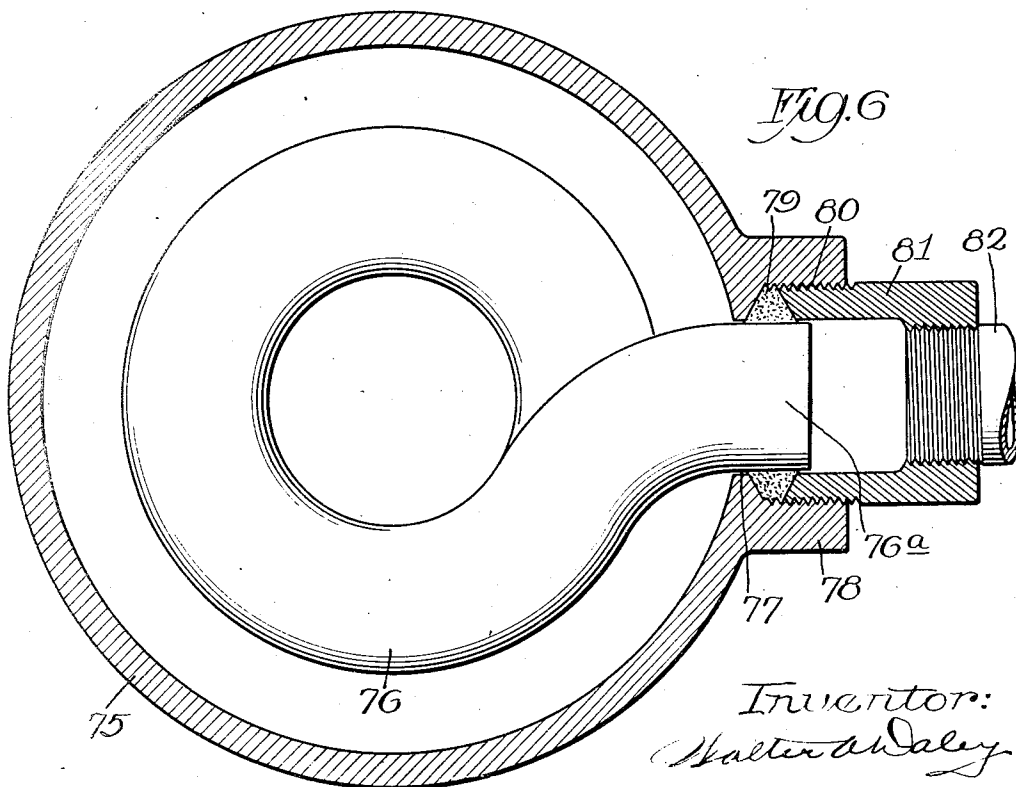
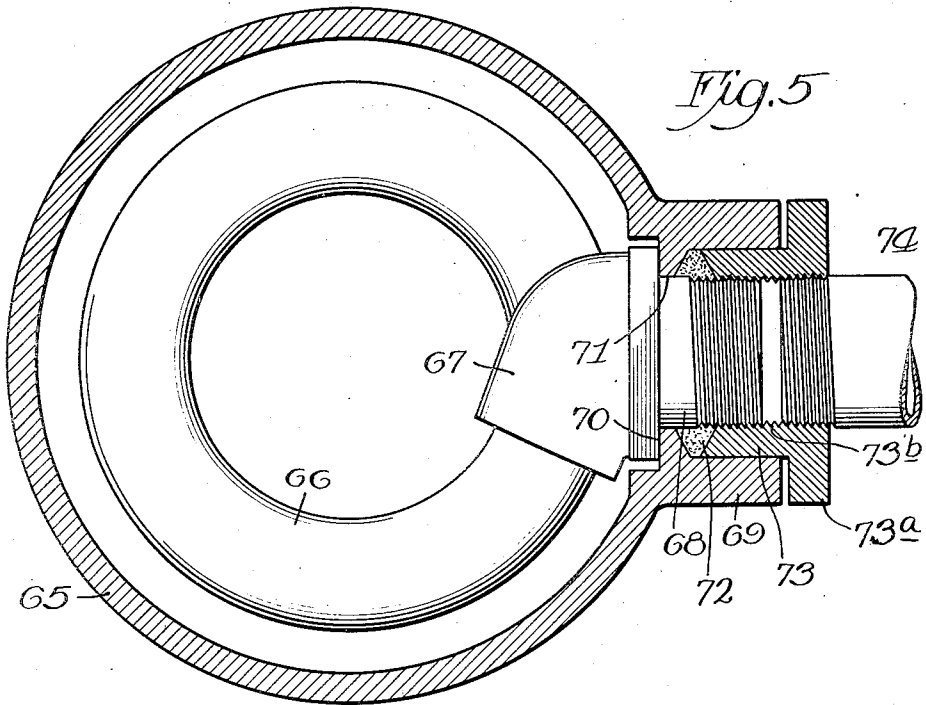
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WATER HEATER

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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WATER HEATER

Application filed November 11, 1927. Serial No. 232,699.

This invention relates to improvements in water heaters and its purpose is to provide an improved heater adapted for use in conjunction with boilers and the like for heating water for household or domestic use.

The principal object of the invention is to provide an improved water heater having improved means for removing the working parts from the casing thereof. Still another object is to provide a water heater comprising an improved coupling for detachably connecting the heating coil thereto. A further object is to provide a water heater having improved means for permitting the removal of the heating coil from the casing thereof without disconnecting the external pipe connections. A further object is to provide an improved coupling for water heaters or the like. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings, in which one embodiment is illustrated. In the drawings, Figure 1 shows a vertical section of an improved water heater embodying the features of the present invention;

Figure 2 shows a top plan view of the heater illustrated in Fig. 1 with the top cover thereof removed and the improved coupling shown in horizontal section;

Figure 3 is a partial vertical section through the coupling of a modified form of heater embodying the principles of the present invention;

Figure 4 is a partial vertical section through a heater casing showing a modified means of forming a fluid-tight joint;

Figure 5 is a horizontal section showing a modified connection of the heating coil with the external pipe, and

Figure 6 is a horizontal section showing still another modification of the connec-

tion between the heating coil and the pipe.

In the accompanying drawings the invention is shown as embodied in a water heater comprising a casing 10, preferably of substantially cylindrical form, which forms the heating chamber. The casing 10 is provided with a removable cover 11 which is detachably secured thereto by bolts or studs 12 so that, upon removal of this cover, access may be had to the working parts which are located within the heating chamber. The side wall of the casing 10 is provided with a boss 10^a having an aperture therethrough which is internally threaded to be engaged by a pipe 13 through which boiler water, from a boiler or the like, is adapted to pass into the heating chamber. The lower wall of the casing 10 is provided with a boss 14 which is internally threaded to be detachably engaged by an outlet pipe 15 through which the boiler water circulates back to the boiler where it is heated. Within the heating chamber of the casing 10 there is mounted a heating coil 16 made up of two helical pipes 16^a and 16^b which are located one within the other end and which have their ends arranged to communicate with the headers 17. These headers have apertures in their walls and water-tight connections are made with the ends of the pipes 16^a and 16^b by brazing or other suitable connecting means. The water which is to be heated for domestic purposes or the like is adapted to pass into the lower end of the heating coil 16 and to circulate upwardly therethrough being heated by the transfer of heat through the walls of the pipes 16^a and 16^b from the hot boiler water which circulates through the heating chamber.

The casing 10 is provided on the side thereof opposite the pipe 13 with two similar integrally formed hollow bosses or projections 19, which form auxiliary casings located adjacent the upper and lower ends of the casing. These bosses 19 are similar

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and connections are made through each of them with one end of the heating coil 16 so that it will be necessary to describe in detail only one of the bosses 19 and its associated parts. Each boss 19 is provided with an interior chamber 20 having a threaded opening at its upper end which is detachably engaged by the end of a pipe 21 through which the water for domestic purposes is adapted to pass. The chamber 20 communicates with the interior of the casing 10 through a circular opening 22 formed in the wall of the casing and through this opening a connection is established with one of the headers 17. Around each of the openings 22, the wall of the casing 10 is provided with a seat 23 of rectangular shape against which the rectangular end face 17^a of the header is adapted to seat and the header is provided inwardly of this face 17^a with a threaded opening 24 engaged by one threaded extremity of a coupling sleeve 25. The header extends into the rectangular recess 23^a in which the seat 23 is formed so that the rotation of the header is prevented. The opening between the chamber 20 and the heating chamber of the casing 10 is enlarged around the outer end of the coupling sleeve 25 to form a packing chamber 26 and an inclined annular seat 27 is formed at the inner end of each packing chamber so that when packing material 28 is forced against this inclined surface 27 it is adapted to be forced inwardly against the outer annular surface of the coupling sleeve 25 to form a water-tight joint between the chamber 20 and the casing 10. The outer portion of the ring of packing material 28 is engaged by an annular packing ring or gland 29 which threadedly engages the outer threaded part of the outer extremity of the coupling sleeve 25 and which is open at its outer end to permit water to pass there-through into or from the coupling sleeve. The packing gland 29 is provided with oppositely disposed notches 29^a in its outer end so that it may be engaged by a wrench and the coupling sleeve 25 is provided with notches 25^a for the same purpose. To permit access to the coupling for assembling and disconnecting the same, each boss 19 is provided opposite the coupling sleeve 25 with a threaded opening 30 which is normally closed by a threaded plug 31 having a rectangular projecting head 31^a adapted to be engaged by a wrench.

By means of the foregoing construction, the headers 17 at the upper and lower ends of the heating coil 16 are detachably connected to the walls of the casing 10 in such a way as to communicate with the chambers 20 of the bosses 19 and the water to be heated passes through one of the pipes 21 thence through one of the chambers 20 and after going through the heating coil 16,

passes outwardly through the other chamber 20 and the other pipe 21. If for any reason it is desirable to withdraw the heating coil 16 for renewal or repair, the cover 11 of the casing 10 may be removed and the plugs 31 may be removed from the bosses 19 after which the operator may detach the packing glands 29 and the coupling sleeves 25 and thereby permit the disconnection of the heating coil 16 from the casing 10 without detaching the pipes 21 through which the water for domestic use is circulated to and from the heating device. In this way the heating coil may be renewed or repaired or the packing joints may be adjusted or the packing removed without in any way disturbing the connections of the pipes 21 with the walls of the casing.

In Figure 3 of the drawings there is illustrated a modified form of casing construction according to which the casing 35 having a detachable cover 36 is provided with a projecting boss 37 having a threaded aperture 38 therein normally closed by a plug 39. This plug 39 is located opposite the openings 40 through the wall of the casing in which there is mounted the threaded coupling sleeve 41 having connection with the header 42 of the heating coil at one end and having a threaded connection at the other end with the packing gland 43 which serves to compress the annular ring of packing material 44. In this form the wall of the chamber 45 within the boss 37 is provided with another threaded opening 46 above the plug 39 to permit the horizontal extension of a pipe 47 through which the water for domestic purposes is circulated to or from the heating device.

A modified form of means for forming a fluid-tight joint between the heating coil and the wall of the casing is shown in Figure 4 where the casing 50 is illustrated as having a projecting boss 51 provided with an interior chamber 52 from which an opening 53 leads through the wall of the casing to the heating chamber 54 of the casing in which the heating coils are located. The heating coils have connected thereto the header 55 which is provided with a rectangular or other non-circular portion 56 arranged to project into a similarly shaped recess 57 formed in the wall of the casing around the opening 53, the recess forming a seat 57^a around the opening for a gasket 58 which extends around the inwardly projecting portion 59 of the header. The header 55 has an opening within the part 59 and this opening is internally threaded for detachable engagement with a packing gland 60, the outer enlarged portion 60^a of which substantially fits the outer enlarged portion 53^a of the opening 53. Within the inner part of the opening 53^a and around the reduced portion of the gland 60 there is thus

formed an annular packing chamber in which is mounted packing material 61, some of which may extend around the annular part 59 of the header. The wall of the packing chamber may be provided with an annular beveled surface joining the enlarged portion 53^a of the opening 53 with the reduced portion 53^b which surrounds the part 59 of the header. The wall of the chamber 52 is provided with an opening 62 adapted to be engaged by a detachable plug so that access may be had to the packing gland 60 without detaching the pipe which engages the opening 63 in the upper end of the chamber 52. A similar construction may be employed at the lower ends of the heating coils.

In Fig. 5 of the drawings there is illustrated a modification in which the casing 65 has mounted therein a heating coil 66 provided with a header 67 having a tubular nipple 68 extending therefrom into the opening which is formed in the boss 69 located on the side of the casing. The header 67 engages a seat 70 around the opening 71 which is engaged by the nipple 68. The opening 71 is enlarged outwardly from the seat 70 to form a packing chamber 72 containing suitable packing material which is adapted to be compressed by a packing gland 73 having a hexagonal flange 73^a which overlies the outer end of the boss 69. This packing gland is adapted to be forced inwardly to compress the packing material around the nipple 68 and, in the embodiment shown in Fig. 5, this is accomplished by internally threading the gland 73 as shown at 73^b so that when the gland is inserted it threadedly engages the externally threaded nipple 68 and thus compresses the packing material within the packing chamber while at the same time forcing the header 67 against its seat 70. The gland 73 is also threadedly engaged by the external pipe connection 74 so that a connection to the water supply or circulating pipe is established directly through the gland. Other parts of the construction may be as illustrated in Fig. 1 and upon removing the gland 73 from its engagement with the nipple 68, the parts may be disassembled.

The modification illustrated in Fig. 6 of the drawing comprises a casing 75 having mounted therein a heating coil 76, the extremity 76^a of which extends into the opening 76 formed in the wall of the casing and through the boss 78 which is cast integrally with the wall. The outer portion of the opening 77 is enlarged to form a packing chamber 79 in which suitable packing material is mounted and this enlarged portion of the opening is internally threaded as shown at 80 to be engaged by the externally threaded packing gland 81. When this gland is forced inwardly it compresses the

packing material in the chamber 79 thus forming a water-tight chamber around the extremity 76^a of the heating coil while at the same time serving to hold the coil in place. The outer end of the packing gland 81 is internally threaded to be engaged by the pipe 82 through which the water circulates to or from the coil 76. This modification of the connection of the coil with the external pipe may be employed with a heating unit having the other parts thereof constructed as shown in Fig. 1.

In this specification and in the accompanying claims the invention is referred to as a water heater but it may of course be used to heat oil or other liquids.

Although certain embodiments of the invention have been illustrated, and described, in the foregoing specification, it will be understood that the invention may be embodied in various other forms within the scope of the appended claims.

I claim:

1. A water heater comprising a casing having an opening in its wall, an auxiliary casing carried by said first named casing and having communication therewith through said opening, a heating element terminating in a tubular member located in said opening, packing material engaging said tubular member in said opening, and means for compressing said packing material.
2. A water heater comprising a casing having an opening in its wall, an auxiliary casing carried by said first named casing and having communication therewith through said opening, a heating element terminating in a tubular member located in said opening, packing material engaging said tubular member in said opening, means for compressing said packing material, and a water pipe connection communicating with said auxiliary casing.
3. A water heater comprising a casing having an opening in its wall, an auxiliary casing carried by said first named casing and having communication therewith through said opening, a heating element mounted in said first named casing and terminating in a tubular extension located within said opening, packing material engaging said extension, and means for compressing said packing material around said extension.
4. A water heater comprising a casing having an opening in its wall, an auxiliary casing carried by said first named casing and having communication therewith through said opening, a water pipe connection communicating with said auxiliary casing, a heating element mounted in said first named casing and having a communicating member projecting into said opening, and means for forming a water-tight connection be-

tween said communicating member and the wall of said first named casing.

5. A water heater comprising a casing having an opening in its wall, an auxiliary casing carried by said first named casing and having communication therewith through said opening, a water pipe connection communicating with said auxiliary casing, a heating element mounted in said first named casing and having a communicating member projecting into said opening, means for forming a water-tight connection between said communicating member and the wall of said first named casing, and means for permitting the release of said water-tight connection and the removal of said heating element from said first named casing while said water pipe connection remains in connection with said auxiliary casing.

6. A water heater comprising a casing having an opening in its wall with a seat around said opening, a heating coil having a part engaging said seat around said opening, a coupling sleeve engaging said part of said heating coil and extending through said opening, packing material engaging said sleeve within said opening, and means for compressing said packing material, said casing having an extension provided with a chamber communicating with said sleeve, and means detachably mounted on said extension for permitting the detachment of said heating coil from said casing.

7. A water heater comprising a casing having an opening in its wall with a seat around said opening, a heating coil having a part engaging said seat around said opening, a coupling sleeve detachably engaging said part of said heating coil and extending through said opening, packing material mounted within said opening, and means for compressing said packing material, said casing having an extension provided with a chamber communicating with said sleeve, and means mounted in the wall of said extension for permitting the detachment of said heating coil from said casing, and a water pipe having communication with the chamber of said casing extension.

8. A water heater comprising a casing, an auxiliary casing carried by said first named casing and having communication therewith through an opening, a water pipe connection communicating with said auxiliary casing, a heating coil mounted in said first named casing, a header connected with said coil and located opposite said opening, a coupling member carried by said header and projecting into said opening, means for forming a water-tight connection between said coupling member and the wall of said casing around said opening, and a plug detachably engaging the wall of said auxiliary casing opposite said last named means.

9. A water heater comprising a casing, an

auxiliary casing carried by said first named casing and having communication therewith through an opening, a water pipe communicating with said auxiliary casing, a heating coil mounted in said first-named casing a header connected with said coil and located opposite said opening, a coupling mounted in said opening and detachably engaging said header, means for forming a water-tight connection between said coupling member and the wall of said casing around said opening, and a plug detachably engaging the wall of said auxiliary casing opposite said last-named means.

10. A water heater comprising a casing having a plurality of openings in its walls, said casing having extensions provided with chambers communicating with said openings, water pipes communicating with the chambers of said extensions, a heating coil located in said casing, means for circulating heated water through said casing around said coil, headers connected with the opposite ends of said coil, said casing having a seat around each of said openings engaged by one of said headers, a coupling sleeve threadedly engaging each of said headers and extending through one of said openings, packing material located around each of said sleeves, said casing having annular seats inclined to the axes of said coupling sleeves and engaged by said packing material, packing glands threadedly engaging the outer ends of said sleeves for compressing said packing material, and plugs detachably engaging the extensions of said casing opposite said coupling sleeves for permitting the removal of said coupling sleeves and said packing glands.

11. In a fluid heater, the combination of an outer casing having pipe connections for including the casing in a fluid system, means within the casing to provide a separate passage for fluid, and pipe connections to the casing to include said inner means in another fluid system, said casing having a removable cover, together with coupling elements permitting removal of said inside means from said casing without disturbing any of said pipe connections to said casing, said inside means comprising a tubular coil provided with a head at each end thereof, said casing having external hollow extensions for the said pipe connections by which the said inside means is included in said other fluid system, together with devices for detachably holding said heads in position within the casing.

12. In a fluid heater, the combination of an outer casing having pipe connections for including the casing in a fluid system, means within the casing to provide a separate passage for fluid, and pipe connections to the casing to include said inner means in another fluid system, said casing having a re-

movable cover, together with coupling elements permitting removal of said inside means from said casing without disturbing any of said pipe connections to said casing, said coupling elements comprising upper and lower heads for said inside means, said casing having hollow extensions in communication with said heads, together with fastening devices detachably holding said heads in position, said hollow extensions being provided with said last-mentioned pipe connections to the casing.

In testimony whereof I have subscribed my name.

WALTER A. DALEY.