May 16, 1967 W. A. DEMETRIFF ETAL 3,319,980

DIP TUBE CONNECTION

Filed Aug. 9, 1965

FIG. 2.

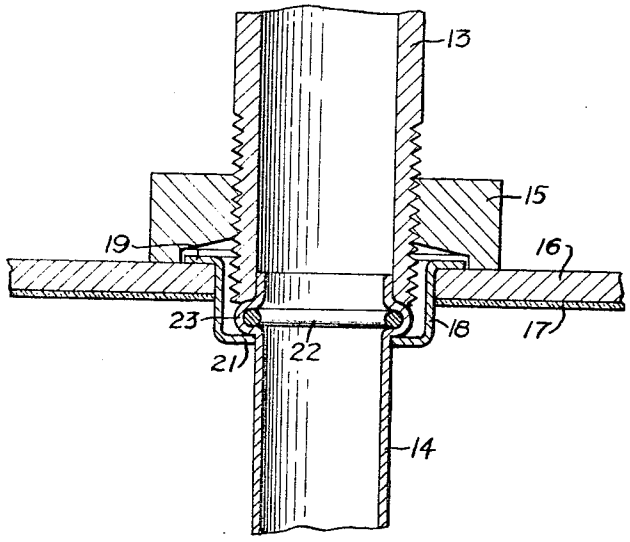


FIG. 1.

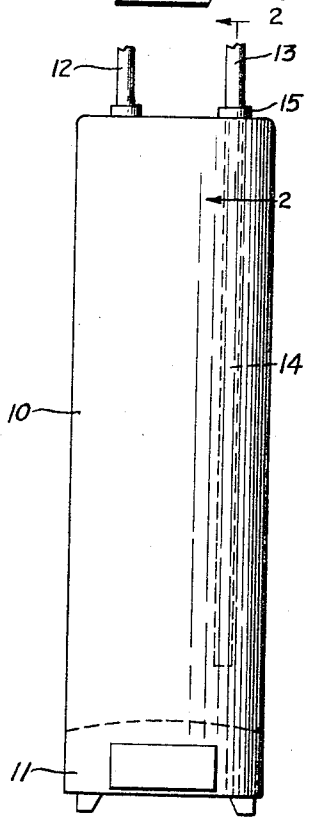
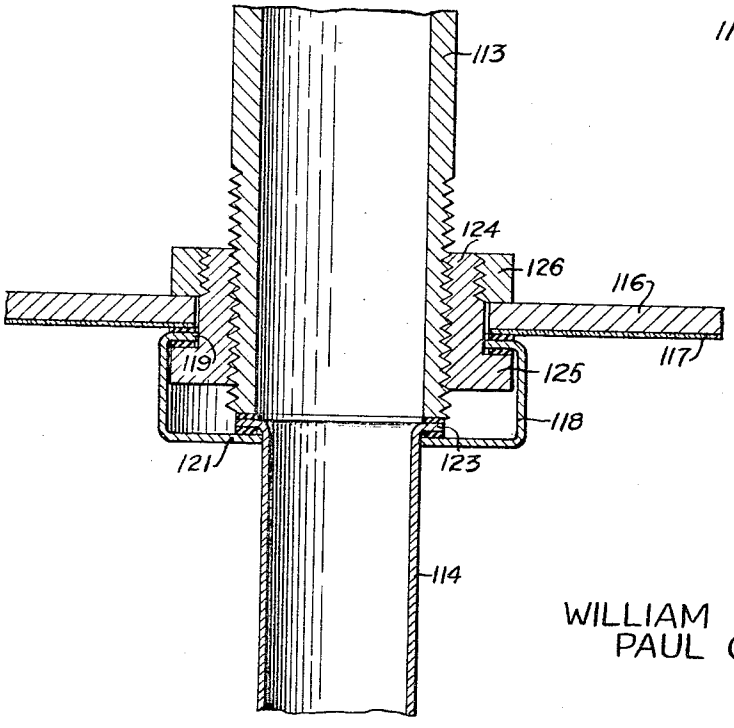


FIG. 3.



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DIP TUBE CONNECTION

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This invention relates to water heaters and more particularly to a connection of the cold water inlet conduit to a water heater tank.

In tank type water heaters, the outlet conduit is normally connected directly to the top of the tank while the cold water inlet is provided with a vertical conduit or tube supported at the top of the tank and discharging near the bottom thereof.

Normally, the connection on the top of the tank is formed by pipe fittings to receive threaded pipe nipples or sections which thread into the fittings.

One of the problems encountered has been the provision of a proper connection and support for the cold water inlet conduit, or tube, by a fitting at the top of the tank. Relatively long fittings have been required to enable threading in a conventional tapered nipple to maximum depth and such fittings are difficult to weld to the tank top. Furthermore, with connections of this type, there is danger of direct exposure of the fittings or nipple to water in the tank with consequent corrosion.

It has been proposed to seal the inlet conduit to the tank top by pressing a flange or enlarged portion thereon engaging directly against the tank top around an opening therein by a pipe nipple to effect a seal. Where the tanks are lined with glass or plastic, the seal pressure so created against the tank top is very apt to cause cracking of the lining, or, if the tank top is so heavy and rigid as not to deflect, it may not be possible to insert a pipe nipple far enough into the fitting to effect a proper connection. It is accordingly one of the objects of the present invention to provide a water heater in which the cold water inlet tube is sealed in a fitting at the top of the tank.

Another object is to provide a water heater in which the cold water inlet tube can be inserted in the tank after completion thereof and will be secured and sealed in place by a pipe nipple threaded into a fitting secured to the tank top.

According to a feature of the invention, the water inlet tube is supported by a cup member projecting into the tank below the top thereof and against which an enlarged upper end of the tube is sealed. The cup member may be formed of a relatively thin non-corrosive material, such as stainless steel, and have sufficient flexibility so as to permit full insertion of a pipe nipple into the fitting without damage to the tank and at the same time insures that there will be no direct exposure of the fitting or nipple threads to the water in the tank.

The above and other objects and features of the invention will be more readily apparent from the following description when read in connection with the accompanying drawings in which:

FIGURE 1 is a side elevation of a typical water heater of the type with which the invention is used;

FIGURE 2 is a partial enlarged section on the line 2—2 illustrating the cold water tube connection; and

FIGURE 3 is a section similar to FIGURE 2 of an alternative construction.

As shown in FIGURE 1, the invention is applied to conventional tank type water heaters having a water tank generally indicated at 10 provided at its lower heat end with a burner compartment or with other desired heating means in the spacer 11. Heated water is taken from the tank through a hot water pipe 12 which may be of a

conventional construction connected to the tank in the usual manner. Cold water is supplied to the tank through a pipe 13 and through an inlet tube 14 which is secured to a fitting indicated at 15 at the top of the tank and which discharges the incoming cold water near the bottom of the tank.

As shown in FIGURE 2, the tank may have a substantially flat top 16 formed of steel or similar material and provided with a non-corrosive lining 17 of glass, plastic or the like. The fitting 15 comprises a relatively thin inner threaded nut member formed with suitable pipe threads to receive pipe threads on the cold water conduit 13 which may be a length of conduit or a nipple connecting the main cold water line to the tank. The fitting 15 is welded to the tank around an opening in the top 16, as shown.

According to the present invention, a cup member shown at 18 is inserted in the opening in the tank top and is secured in place therein. As shown, the cup member has an upper flange 19 overlying the top of the tank and which is welded thereto at the same time the fitting 15 is welded to the tank. At its bottom, the cup member is formed with an opening of a diameter to pass the cold water inlet tube 14 and which is smaller than the internal diameter of the cup to leave an inturned flange 21. In the construction shown in FIGURE 2, the cold water inlet tube 14 is formed of plastic material and a metal ring 22 is inserted in the tube near its upper end to provide an outwardly extending flange portion 23. The ring 22 may be inserted when the tube is formed or, in the case a thermoplastic material is used, it may be heated sufficiently to soften it to the point where the ring can be forced into its end. The external diameter of the tube 14, as shown, is approximately the same as the internal diameter of the cold water inlet conduit or nipple so that the short upper end of the tube above the ring 22 will extend into the cold water inlet conduit or nipple when the parts are assembled.

With the construction as shown, it will be apparent that the cold water inlet tube can be inserted in the tank after it has been completed and after the fitting and cup member are assembled thereon. To accomplish this, the tube is simply inserted through the fitting 15 and through the opening in the bottom of the cup member until the enlarged portion 23 rests on the flange 21. When the inlet conduit or nipple is threaded into the fitting 15, its lower end will engage the enlarged portion 23 and press it sealingly against the flange 21. Since the cup member is sealed to the tank by welding and the tube is sealed to the cup member by pressure, with the tube also being sealed against the inlet conduit or nipple, it will be apparent that the threads of the inlet conduit or nipple and the fitting are sealed against access thereto of water in the tank. Furthermore, the cup member being relatively thin has sufficient flexibility so that the inlet conduit or nipple can be threaded fully into the fitting without any likelihood of bending or damaging the tank top itself.

FIGURE 3 shows an alternative construction, parts thereon corresponding to like parts in FIGURES 1 and 2, being indicated by the same reference numerals, plus 100. In this construction, the fitting comprises a nut member 124 formed with pipe threads on its interior and with conventional standard threads on its exterior at one end. The fitting is provided with a circular flange 125 larger than the opening in the tank top and which lies within the tank. The external threaded portion of the fitting projects above the tank, as shown, to receive a nut 126.

The cup member 118 in this case has an inturned flange 119 at its upper end extending between the head 125 of the fitting and the tank top around the opening

therein. Preferably annular seals are placed between the flange **119** and the fitting head and the top of the tank, as shown, so that when the nut **126** is tightened, the cup member will be secured in place and will be sealed liquid tight to the top of the tank.

The upper end of the cold water inlet tube **114** which may be made of either plastic or metal is bent outwardly to define an annular flange **123** which rests against the lower inturned flange **121** of the cup member. Preferably, sealing material is provided on both sides of the flange **123** to seal against the flange **121** of the cup member and against the lower end of the inlet conduit or nipple **113** when it is assembled in place, although the flange of the cold water inlet tube may be of a material which will itself provide a sufficient seal. It will be seen that this construction, except for the manner of assembly, is essentially similar to that of FIGURE 2 and accomplishes the same desirable purposes.

While two embodiments of the invention have been shown and described in detail, it will be understood that this is illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. In a water heater including a tank having a hot water outlet connection adjacent its top, a cold water inlet connection comprising an internally threaded coupling secured to the top of the tank in registration with an opening therein, a cup member in the tank secured to the top thereof and formed in its bottom with an opening registering with and of smaller diameter than the threaded opening in the coupling, and a vertical conduit extending through the opening in the cup member and formed at its upper end with an enlarged portion of larger diameter than the opening in the cup member but of smaller diameter than the opening in the coupling to pass therethrough, the enlarged portion engaging and supported by the bottom of the cup member around the opening therein.

2. The water heater of claim **1** in which the coupling is a short nut welded to the top surface of the tank.

3. The water heater of claim **2** in which the cup member has an outwardly extending flange at its top trapped between the coupling and the top of the tank.

4. The water heater of claim **1** in which the coupling is a tubular sleeve extending through the opening in the top of the tank with an enlarged head in the tank and a fastening securing it against the outer surface of the tank.

5. The water heater of claim **4** in which the cup member has an inturned flange at its top fitting between the enlarged head on the coupling and the top of the tank.

6. The water heater of claim **1** in which the conduit is formed of plastic material and the enlarged portion at the upper end thereof is formed by a ring of larger diameter than the conduit inserted into the conduit.

7. The water heater of claim **1** in which the cup member is formed of relatively thin material to be resilient.

8. The water heater of claim **1** including a pipe fitting threaded in the coupling and engaging the enlarged portion of the conduit and pressing it against the bottom of the cup member.

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