Sept. 1, 1953 A. W. CARLSON 2,650,575

WATER HEATER FLUE CONSTRUCTION

Filed March 31, 1950

FIG. 1.

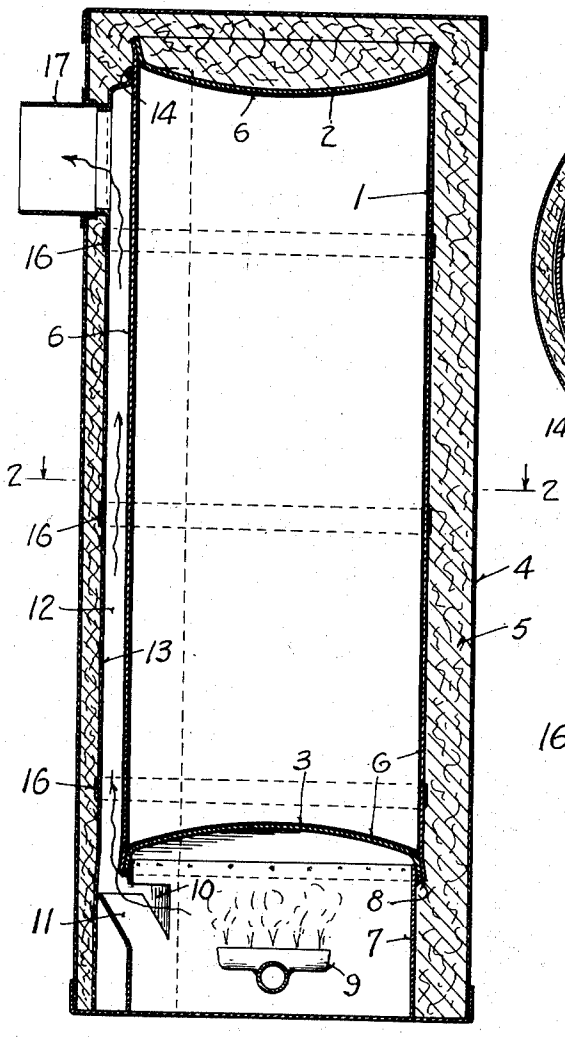


FIG. 2.

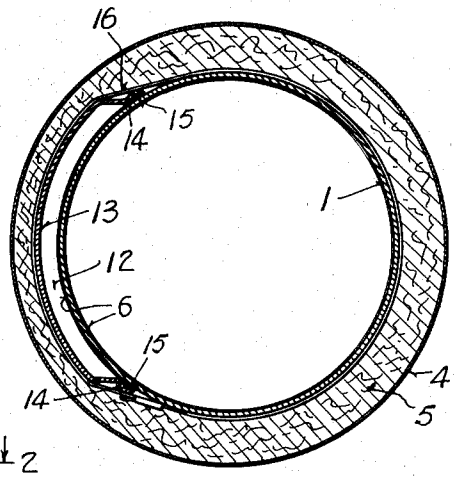


FIG. 3.

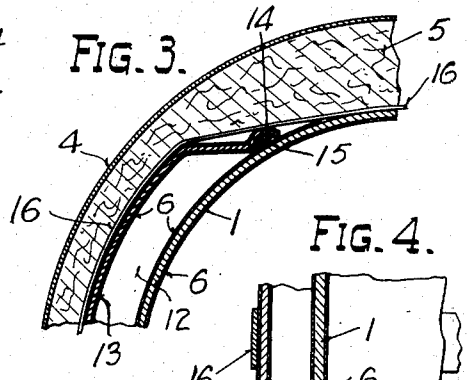
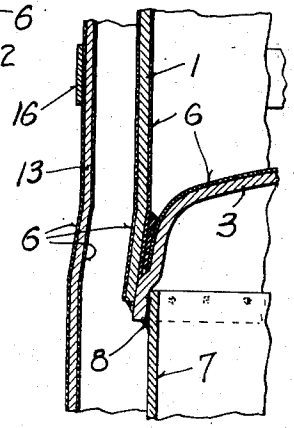


FIG. 4.



INVENTOR.
Arthur W. Carlson

BY
Andrus & Sceales

ATTORNEYS.

Patented Sept. 1, 1953

2,650,575

UNITED STATES PATENT OFFICE

2,650,575

WATER HEATER FLUE CONSTRUCTION

Arthur W. Carlson, Kankakee, Ill., assignor to A. O. Smith Corporation, Milwaukee, Wis., a corporation of New York

Application March 31, 1950, Serial No. 153,277

2 Claims. (Cl. 122—17)

1

This invention relates to water heater flue construction and more particularly to a gas water heater having an external flue for discharge of burner gases.

One object of this invention is to provide a water heater with a flue that can readily be mounted between the heater tank and the insulating material within the heater casing.

Another object is to provide a water heater having a flue entirely without the heater tank thereby eliminating tank joints and reducing the possibility of leakage of the liquid contained within the tank.

Another object is to provide a heater with an external flue that may be readily secured to the heater tank, the tank having been coated with ceramic enamel or the like, without injuring such coating.

Another object is to provide a water heater having an external flue on the outside of the tank with the flue being coated with ceramic enamel and overlying an enamel coated strip of the shell of the tank.

Another object is to provide a water heater having an external flue that provides a large surface adjacent to the water tank for the transfer of heat from the flue gas to the tank without surrounding the entire tank wall with a jacket-like flue that would hinder the installation and servicing of thermostats and other fittings.

Another object is to provide a water heater with an external flue which employs a burning unit located beneath the water tank whereby both the bottom and vertical surfaces of the tank are in direct contact with the heated gas.

Another object is to provide in a water heater having an external flue means for deflecting condensate that forms in the flue to a point near the burner unit where it will be evaporated and not contact the heater's insulating material.

The external flue water heater of the invention in general comprises a cylindrical tank having a casing surrounding the same and spaced therefrom by suitable heat insulating material. A burner is disposed beneath the tank and a channel-shaped semicylindrical elongated flue member extends upwardly from adjacent the burner along the tank wall to which it is sealed, to near the top of the tank where it communicates with a discharge flue for discharge of the burner flue gases.

Other objects and advantages of the invention will appear in the following description of the accompanying drawing in which:

Figure 1 is a vertical section of a hot water tank with an external flue constructed in accordance with the invention;

2

Fig. 2 is a horizontal sectional view taken along line 2—2 of Fig. 1 and

Fig. 3 is an enlarged fragmentary horizontal sectional detail showing a flue joint; and

Fig. 4 is an enlarged fragmentary vertical section showing the lower portion of the tank.

Referring to the drawing, the water heater shown comprises an inner tank formed of a generally cylindrical shell 1 closed at the upper end by a head 2 and at the lower end by a head 3, and separated from an outer enclosing casing 4 by suitable insulating material 5 which prevents loss of heat from hot water confined in the inner tank.

The inner surface of the shell and heads of the tank are coated with ceramic enamel 6 or similar material provided to prevent corrosion of the metal of the tank.

The inner tank is supported within casing 4 by a skirt ring 7 which corresponds to the diameter of shell 1 and extends downwardly from lower head 3 a substantial distance. Ring 7 is intermittently tack welded to head 3 and the joint between head 3 and skirt ring 7 is sealed by a suitable cement 8 to form a substantially closed burner chamber inside the skirt.

A gas burner 9 which is connected to a suitable source of gas, not shown, is positioned beneath the tank within the skirt ring to heat the liquid confined in the tank.

In order to carry off the combustion gases generated by burner 9, skirt ring 7 is provided with a generally rectangular shaped opening 10 near the upper part of one side thereof formed by slitting and flaring outwardly a portion of ring 7 to form a deflector 11 the use of which will be described hereinafter.

Opening 10 communicates with an external flue passage 12 formed externally of shell 1 by an elongated arcuate shaped flue jacket 13 which extends from a line on the same plane as the lower end of skirt ring 7 to substantially the upper end of shell 1 of the inner tank. Jacket 13 has the general curvature of shell 1 with a slight outward offset at the joint of the shell and lower head to make passage 12 of consistent size and is channel shaped so that its longitudinal edges may contact the shell to space the body of the jacket from shell 1 and define flue passage 12. The periphery 14 of flue jacket 13 contacts the vessel wall except at its lower portion and is beaded to receive a heat resistant gasket such as

asbestos rope 15 to seal the joint between flue plate 13 and the shell.

The flue jacket 13 is strapped to shell 1 by a plurality of bands or metal straps 16 which tightly secure jacket 13 in place.

Gases are discharged from flue passage 12 into discharge pipe 17 which is sealed into flue jacket 13 near the upper end of the plate and connected at the outer end with a chimney or other discharge means, not shown.

The flared deflector 11 of skirt ring 7 extends outwardly to flue jacket 13 somewhat above the bottom end of the heater to direct the flue gases within the skirt ring upwardly into flue passage 12. At the same time, the deflector 11 of ring 7 directs any falling products of combustion and condensate accumulating within the flue passage 12 into the skirt ring or burner chamber where they are consumed or evaporated without danger of contact with insulating material 5. Condensate appears to form on shell 1 and tends to run down the shell. Deflector 11 thus operates as a condensate deflector to direct the dripping condensate into the burner chamber where it is dissipated.

In order to prevent corrosion of the shell wall and flue jacket 13, ceramic enamel 6 or similar material is applied to the inside and outside of the flue jacket and to shell 1 beneath the location of flue jacket 13.

In assembling the flue of the invention on the outside of tank shell 1, the inner tank, in the course of fabrication and assembly, is coated on the outside where the flue is to be located with a coating of ceramic enamel 6.

A skirt ring 7, previously provided with a deflector 11 by slitting and flaring a portion of the wall outwardly, is tack welded to the bottom of tank shell 1, and the joint therebetween is sealed with cement 8.

The flue jacket 13 is fabricated from a flat plate which is formed to the general curvature of shell 1 and channeled for spacing the body of the jacket from the shell. The periphery of the jacket, except for the lower edge, is beaded, the upper corners of jacket 13 being curved so that the bead continues uninterruptedly around three edges of the jacket.

Thereafter, asbestos rope 15 is glued or otherwise secured within the bead of flue jacket 13 and the flue jacket is assembled to lie over the enamel coated area of shell 1 and the deflector 11 of skirt ring 7. While held in this position, a plurality of metal straps 16 are applied around shell 1 and jacket 13, to strap the jacket securely to shell 1 and define a flue passage leading from the skirt ring burner chamber beneath shell 1 upwardly past deflector 11 and the wall of shell 1, and to discharge pipe 17 near the top of jacket 13.

The invention provides a less expensive construction for disposing of flue gases which adequately handles and disposes of condensate formed in the flue passage without contact with the insulating material employed, and also which confines products of combustion within the heater unit.

Various embodiments of the invention may be employed within the scope of the accompanying claims.

I claim:

1. A flue unit for a hot water heater having an inner tank and an outer casing spaced therefrom by heat insulating material, said unit comprising a generally cylindrical supporting member secured to said tank and extending downwardly therefrom directly beneath the same to define a gas burning chamber for receiving hot gases for heating the liquid in said tank, a flue discharge jacket secured longitudinally along the wall of said tank between the tank and casing with the periphery of the jacket sealed to the wall of the tank, and said wall and jacket defining a flue passage extending upwardly from said supporting member to dispose heated gas in direct contact with the wall of the tank throughout substantially the length of said wall, and a deflector flared outwardly from an opening in said supporting member to substantially contact the inside wall of the flue member to direct combustion gases upwardly for discharge into the flue passage and to guide condensate into said gas burning chamber for dissipation without contact with said insulating material.

2. In a hot water heater having an inner tank and an outer casing spaced therefrom by heat insulating material and a ring member extending downwardly from said tank to support the tank within the casing and providing a chamber for burner means to apply heat directly to the bottom of the tank the combination comprising, a flue which comprises a channel shaped elongated flue jacket secured to said tank and sealed along its periphery to a portion of the wall of the tank and the ring member and co-extending downwardly of the tank and ring member to rest on the bottom of the casing with a discharge opening in the upper portion of the jacket, and said jacket being shaped to space the body thereof from the tank wall and ring member to define a flue passage between the jacket and a portion of the tank wall through which hot gases from the burner chamber pass in direct contact with said wall, and a deflector plate provided from a portion of the wall of the ring member and flared outwardly from the ring member and across the flue passage to close off the flue passage downwardly of the plate and provide an opening in the ring member for passage of gases upwardly for discharge through the flue passage and to direct condensate, collecting in the flue passage, into the gas chamber for dissipation.

ARTHUR W. CARLSON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
307,852	Folsom	Nov. 11, 1884
1,107,548	Post	Aug. 18, 1914
1,452,676	Cole	Apr. 24, 1923
1,802,733	Murray, Jr.	Apr. 28, 1931
1,928,649	Estes	Oct. 3, 1933
1,995,608	Feyling	Mar. 26, 1935
2,056,989	Strong	Oct. 13, 1936
2,084,287	Handley	June 15, 1937
2,098,489	Everhard	Nov. 9, 1937
2,218,422	Haddock	Oct. 15, 1940
2,232,366	Chappell	Feb. 18, 1941
2,549,755	Burwell	Apr. 24, 1951
2,559,110	Burwell	July 3, 1951