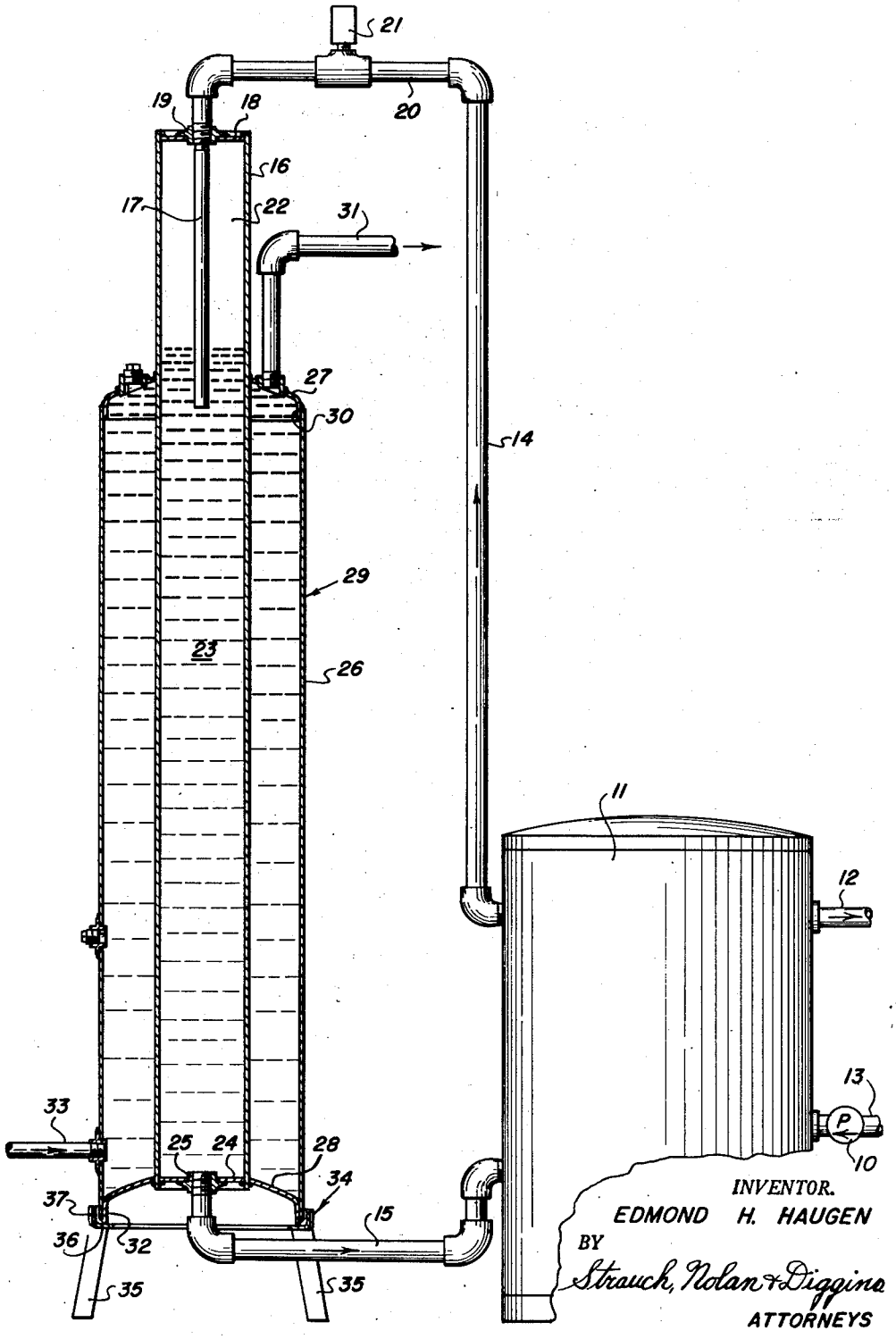
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HEATER ASSEMBLY WITH EXPANSION TANK

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HEATER ASSEMBLY WITH EXPANSION TANK

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This invention relates generally to hot water heating systems and more specifically to a novel expansion tank and domestic hot water heater assembly.

It is the major object of this invention to provide in a closed hot water heating system, a novel expansion tank having at least a portion of its walls submerged in a storage tank for domestic hot water for heating the water in the storage tank.

A further object of this invention is to provide in a closed hot water heating system an elongated expansion tank having communicating air and water spaces, and a domestic hot water storage tank surrounding the water space of the expansion tank.

Further objects of the invention will appear as the description proceeds in connection with the appended claims and the annexed drawing wherein the figure illustrates the boiler, expansion tank and hot water storage tank in the system, with the tank assembly in section to show the common wall construction of the preferred embodiment.

A boiler **11**, which may be of any conventional type such as that disclosed in United States Letters Patent No. 2,491,517 issued on December 20, 1949 to M. A. Powers et al., has its hot water space connected by a supply main **12** and a return main **13** to radiators or other heat dissipating devices (not shown). A pump **10** is provided in the system for circulating the boiler water therethrough.

The boiler hot water space is also connected by a conduit **14** and a return conduit **15** to an elongated vertically disposed cylindrical tank shell **16**. The upper end of conduit **14** is connected by a horizontal conduit **20** to the upper end of a relatively short pipe **17** that projects through the top wall **18** of tank **16**, a water tight mounting and fitting being provided at **19**. Wall **18** is an annular metal plate welded along its outer periphery to the inner wall of tank **16**.

A safety valve **21** is provided, preferably in conduit **20**, for discharging upon predetermined pressure in tank **16**. Within tank **16**, pipe **17** projects downwardly through an air space **22** and into a water space **23**, the lower open end of pipe **17** being beneath the surface of the water.

The bottom wall **24** of tank **16** is an annular plate having its outer periphery welded to the inner wall of tank **16** and carrying a fitting **25** providing a water tight joint with conduit **15**. Thus hot water from the boiler space rising through conduit **14** discharges through pipe **17** into expansion tank **16** and return conduit **15** completes circulation to the boiler. The water space **23** occupies the major part of the volume of tank **16**, the size of air space **22** being that needed to accommodate expansion in volume of all of the hot water in the disclosed closed hot water system which includes the boiler, the radiator and the expansion tank. When the system is initially filled with water pumped through the boiler, tank **16** is filled with water up to the level of the bottom of pipe **17**, air being displaced through conduit **15**. After the water level in tank **16** covers the lower end of pipe **17**, air is trapped in the upper air space portion of the tank and compressed somewhat to permit and maintain the illustrated water level in the tank. When water in the system expands in heating it further compresses the air in space **22**.

The size of the expansion space at **22** may be varied to suit the needs of the system by lengthening or shortening the pipe **17** within tank **16**. It will also be appreciated that the relative diameters of the air space and water space portions of tank **16** may be varied to suit conditions,

as by making the tank diameter of the air space somewhat larger where space conditions limit the vertical height of the tank.

Expansion tank **16** is surrounded over its major portion by a cylindrical shell **26** which with the surrounded outer wall of tank **16** and upper and lower end walls **27** and **28** respectively provides a domestic hot water heating and storage tank indicated at **29**.

Upper end wall **27** is upwardly convex and has a cylindrical peripheral flange **30** fitting within shell **26** and welded to it. A conduit **31** for supplying hot water to taps and other domestic devices enters the storage tank **29** through a suitable water tight fitting in wall **27**.

Lower end wall **28** is also upwardly convex, being preferably of the same shape and size as wall **27** but having no conduit fittings. The outer periphery of wall **28** is formed with a cylindrical flange **32** that fits within and is welded to shell **26**. The inner periphery of wall **28** is welded to shell **16** opposite the juncture of end wall **24** with shell **16** so that externally walls **24** and **28** appear to be substantial extensions of each other. A cool water inlet conduit **33** enters the bottom of the storage tank just above wall **28**.

I have thus provided a novel compact expansion and hot water heating and storage tank assembly wherein the inner wall of the heating and storage tank also serves as the outer wall of the expansion tank, which affords optimum heat exchange. The relative lengths of the tanks are such that the heating and storage tank surrounds only water space of the expansion tank, the latter being made relatively long for providing a large area of heat exchange surface, and the air space portion of the expansion tank projects above the level of the surrounding heating and storage tank. This provides an external surface of the expansion tank that is relatively cool and may aid in condensing any steam in the system.

An important aspect of the invention that contributes greatly to its efficiency in operation is that the boiler water, which is always hotter than the water in tank **29** to be heated thereby, circulates through a column in water space **23** that is protectively shielded and insulated by the surrounding tank **29**. In this manner the full benefit of the hottest water is realized in that all of the heat extracted from the boiler water goes to heat the water in tank **29** and no boiler water heat is directly lost to the surrounding atmosphere by radiation. There are heat losses at the outer surface of tank **29** but since the water in tank **29** is at a lower temperature than the boiler water the temperature gradient is relatively lower at the outer wall of tank **29** and hence the actual heat losses from the assembly of the invention are appreciably lower than in most prior art assemblies wherein the domestic hot water tank is surrounded by the tank containing hotter boiler water, the latter having its outer surface exposed for radiation losses.

Exchange of heat between the tanks is both rapid and efficient, and the domestic and boiler hot waters are never intermixed. Systems of this type have been found to provide adequate domestic hot water for an average family. For example, in a system wherein the capacity of storage tank **29** is 35 gallons I employ an expansion tank shell **16** about 8 inches in diameter and a shell **26** of about 18 inches diameter. The height of shell **16** is about 56 inches and shell **26** is about 48 inches so that about 8 inches of shell **16** projects above the storage tank. These figures are understood to be illustrative and in no way limiting the invention.

The entire assembly is mounted on a floor as by a stand **34** having four or more legs **35** and an annular support surface **36** formed with an upturned rim **37**. The tank assembly seats on the stand within rim **37** with the bottom edge of wall flange **32** resting on flat surface **36**.

The convex end wall structure of the combination tank structure provides resistance to stresses encountered during heating and cooling of the parts. The entire apparatus is sturdy and inexpensive to manufacture, and the entire combination tank assembly may be fabricated and tested at the factory so that only pipe connections need be made at the installation point.

The invention may be embodied in other specific forms without departing from the spirit or essential character-

istics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. For use with a boiler having means for circulating water through a space heating system, means for providing and storing domestic hot water comprising two concentric tanks having a common heat exchange wall at their lower regions, said wall projecting above the upper end of the outer tank so as to provide an extension of the inner tank above the outer tank, means for introducing hot boiler system water into the upper end of said inner tank, a boiler system water return connection at the lower end of said inner tank, the extension of said inner tank above the outer tank providing an air space which serves as an expansion space for the boiler water system, and water supply and withdrawal conduits connected to said outer tank which serves as a source of domestic hot water.

2. For use with a boiler having means for circulating water through a space heating system, means for providing and storing domestic hot water comprising two concentric tanks having a common heat exchange wall at their lower regions, said wall projecting above the upper end of the outer tank so as to provide an extension of the inner tank above the outer tank, means for introducing hot boiler system water into the upper end of said inner tank comprising a pipe projecting downwardly through and terminating within said inner tank below the water level therein, a boiler system water return connection at the lower end of said inner tank, the extension of said inner tank above the outer tank providing an air space above said lower end of the pipe which serves as an expansion space for the boiler water system, and water supply and withdrawal conduits connected to said outer tank which serves as a source of domestic hot water.

3. For use with a boiler having means for circulating water through a space heating system, means for providing and storing domestic hot water comprising two upright concentric tanks having a common heat exchange wall at their lower regions, said wall projecting above the upper end of the outer tank so as to provide an extension of the inner tank above the outer tank, a transverse top wall on said inner tank extension, means for introducing hot boiler system water into the upper end of said inner tank comprising a connection for a boiler system water supply conduit in said top wall of said inner tank extension, and a substantially vertical pipe removably secured to said top wall to serve as a continuation of said supply conduit and terminating below the water level in said inner tank, a boiler system water return connection at the lower end of said inner tank, the extension of said inner tank above the outer tank providing an air space above the lower end of said pipe which serves as an expansion space for the boiler water system, and water supply and withdrawal conduits connected to said outer tank which serves as a source of domestic hot water.

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