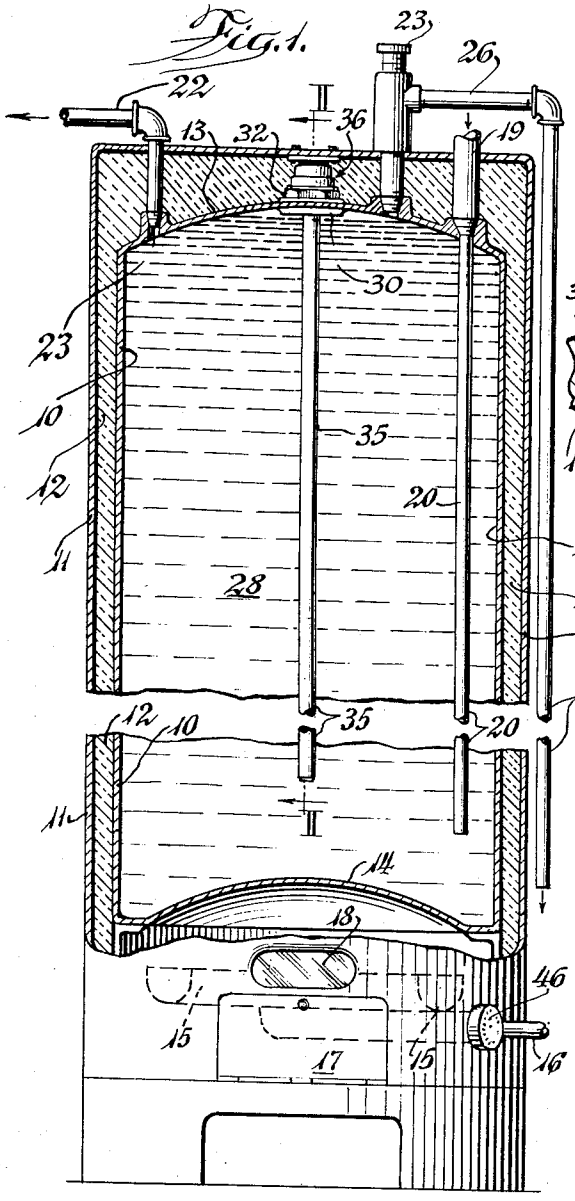
Feb. 2, 1960 F. E. THELEN 2,923,797

HIGH TEMPERATURE CUT-OFF SWITCH AND IMMERSED ROD ASSEMBLY FOR HOT WATER GENERATING TANKS

Filed July 1, 1957

Fig. 1.



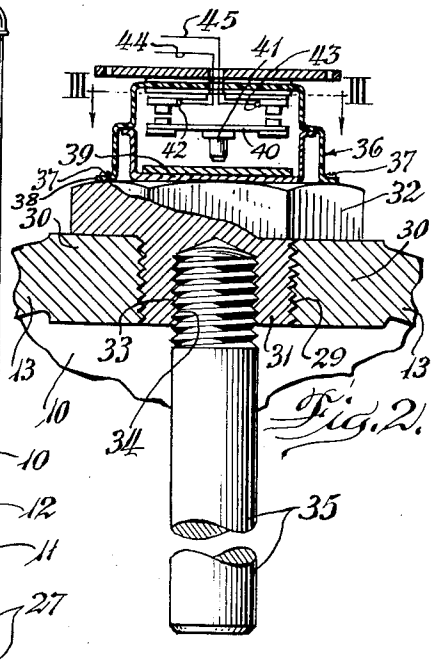




Fig. 2.

Fig. 3.

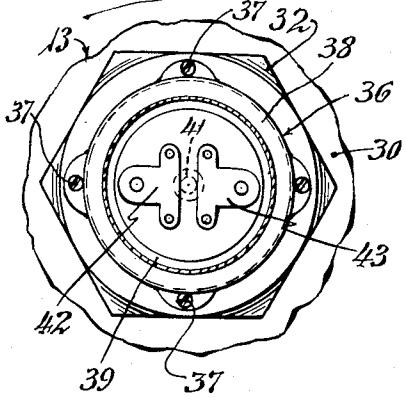
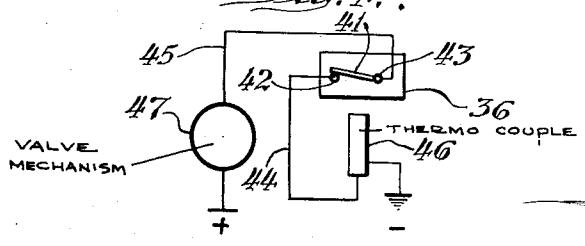



Fig. 4.




Inventor:
Floyd E. Thelen
By Harry C. Alexander
His Attorney.

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# HIGH TEMPERATURE CUT-OFF SWITCH AND IMMERSED ROD ASSEMBLY FOR HOT WATER GENERATING TANKS

Floyd E. Thelen, Atchison, Kans., assignor to Luxra Company, Atchison, Kans., a corporation of Kansas

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3 Claims. (Cl. 200—137)

This invention relates to a high temperature cut-off for hot water heaters and more particularly to electrical cut-offs therefor for attachment to magnesium rod fittings therefor, although it may be advantageously employed in connection with other fittings on hot water heaters.

It contemplates more especially the provision of a unitary fitting for connecting both the electrical cut-off and suspending a magnesium rod to provide a more effective thermal conducting medium thereto, thereby simpylifying the assembly, minimizing the production expense of such devices and possessing an efficient thermal response for the high temperature electrical cut-off of energy to maintain the water temperature at safe maximum limits under all conditions.

Most every modern quality hot water heater is provided with a safety shut-off to insure the safe operation thereof should the gas pilot fail or the burner shut off or terminate the generation of hot water after reaching a pre-set temperature limit. Then, too, quality instantaneous hot water heaters are now equipped with magnesium rods to minimize the corrosion of the water tank and to add to the life thereof. This rod conducts the heat of the water very rapidly to the body of the tank, and particularly to the body top end thereof to provide the most effective temperature indicator response area thereof.

In order to provide the most effective temperature control of hot water generating tank heaters through the medium of a single opening therein, an improved simple fitting has been provided to extend through the customary and standard threaded opening in the tank for mounting of a temperature responsive switch at one end and a magnesium rod at the other end. This is effected with a double threaded pipe fitting having an exteriorly threaded tank engaging portion and an internally threaded end to threadedly receive and connect an element thereto such as an internally suspended magnesium rod in water immersed relation to a hot water generating tank. The exterior surface of the fitting is provided with a simple and effective thermally responsive electric switch mounted thereon to quickly respond to temperature changes in the water to insure efficient operation.

One object of the present invention is to provide a simple fitting having threaded portions for mounting of exteriorly and interiorly disposed operating elements in relation to a hot water generating tank.

Another object is to provide a cylindrical fitting with intermediate threads for mounting two operating elements in relation to a threaded tank opening serving as a support therefor.

Still another object is to provide a hot water generating tank with an externally threaded fitting having a threaded portion for connection thereto and another threaded inside end for mounting of elements in water immersed relation with a tank for mounting of a thermally responsive electric switch in effective thermal communication with the water therein.

A further object is to provide a fitting having an externally threaded portion to serve as an exterior mount for a thermally responsive switch and an internally threaded end portion for suspended mounting of a magnesium rod in effective heat conducting communication between the water in the tank and the thermally responsive electric switch.



Still a further object is to provide a unitary fitting having a series of multiple threads to serve as a dual mount for a thremally responsive electric switch and a magnesium rod in immersed water relation to a hot water generating tank whereby the temperature of the contents is in communicating conductance with both the rod and switch.

Other objects and advantages will appear from a description of an illustrated embodiment of the present invention.

In the drawing:

Figure 1 is a front view in elevation of a hot water generating tank of the instantaneous type provided with a tank mount for an electric thermally responsive switch and a magnesium rod suspending portion embodying features of the present inventon, parts thereof being broken away and shown in section to clarify the showing.

Figure 2 is a sectional view in elevation of the dual fitting and mount taken substantially along line II—II of Figure 1.

Figure 3 is a plan view of the switch and mount viewed substantially from line III—III of Figure 2.

Figure 4 is a schematic wiring diagram showing the electrical relationship between the various elements for controlling the temperature of the water in the tank.

The structure selected for illustration is not intended to serve as a limitation upon the scope or teachings of the invention, but is merely illustrative thereof. There may be considerable variations and adaptations of all or part of the teachings depending upon the dictates of commercial practice. The present embodiment comprises a cylindrical upright tank **10** of galvanized steel construction or of the glass-lined variety which is disposed within a correspondingly shaped and somewhat enlarged jacket or casing **11** having insulation **12** packed therebetween in the chamber defined by the vertical walls and tops of the respective tank and jacket **10—11**. The tank body **10** has a convex integral top **13** and a concave bottom **14**.

The tank **10** has its slightly concave bottom **14** disposed immediately above a standard burner such as a gas burner **15** which communicates with a gas supply pipe **16** provided with an adjustable air regulating shutter of the conventional type (not shown). A closure **17** is provided in the tank jacket or casing **11** immediately below the burner **15** for access thereto and to a pilot light (not shown) for hand lighting with a match. A transparent sight **18** may be provided in the tank casing **11** to enable viewing the flame produced by the burner **15** while in operation to enable adjustment by regulating the air intake shutters (not shown) to the burner **15**.

A cold water inlet pipe **19** threadedly connects with the top and extends downwardly for a considerable distance as at **20** for communication with the bottom interior region of the hot water generating tank **10**. A hot water discharge pipe **22** connects with the top of the tank **10** as at **23** for supplying the hot water to the pipe line. A fusible plug **23** within the relief valve **24** connects with the top of the tank **10** as at **25**, and normally precludes the flow of water through an overflow pipe **26—27** connected thereto for discharge to a sewer or other drainage point. The heated water **28** within the tank **10** communicates with the fusible plug **23** which will melt and open the passage to the overflow pipe **26—27** in the

event the water 28 should rise to a dangerous temperature.

A central threaded aperture 29 in an upraised boss 30 provided centrally within the top 13 of the tank 10, receives an externally threaded mounting fitting 31, in this instance having a reduced exteriorly threaded shank 31 terminating in an enlarged hexagonal flat surface head 32 providing for the application of a wrench for tightening engagement with the tank aperture 29 by means of the threaded shank 31. The externally threaded shank 31 is provided with an axial bore 33 which is interiorly threaded to receive the upper threaded extremity 34 of an elongated magnesium rod 35 that extends downwardly or inwardly below the tank top 12 for immersion into the water 28 for the greater part of the tank 10.

To this end, the magnesium rod 35 has its externally threaded upper extremity 34 complemental to the internal bore thread 33 of the shank 31 to enable the threaded engagement of the magnesium rod 35 therewith for internal suspension for most of the water depth within the tank 10. It will be apparent, therefore, that the elongated magnesium rod 35 will conduct the most elevated temperature of the upper strata of the water 28 to the body of the fitting 32, and the enlarged surface thereof inside the tank housing or jacket 12 and underneath the top insulation 12 will afford the effective support of a thermostatic bellows type switch body 36, in this instance of circular shallow configuration.

The switch body 36 is attached to the upper surface of the magnesium rod fitting 32 by means of suitable fasteners 37 which extend through casing ears 38. A convexly-shaped thermally responsive bottom 39 comprising part of the switch casing, touches the fitting 32 and becomes distorted upwardly when the water temperature reaches a maximum of 205 degrees Fahrenheit which is the safety limit therefor. In so doing, its insulator interior lining 40 touches the metal terminal bridging element 41 to elevate it into contact with the normally closed terminals 42—43 connected in series with the lead wires 44—45 (Figure 4) which are in circuit with a thermocouple 46 and a solenoid operated thermostatic valve mechanism 47. The switch 41 opens the circuit at 205° Fahrenheit to shut off the gas by de-energizing a solenoid actuated thermostatically responsive valve in a manner well known in the art.

While I have illustrated and described a preferred embodiment of this invention, it must be understood that the invention is capable of considerable variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to



avail myself of such variations and modifications as come within the scope of the appended claims.

I claim:

1. An integral unit fitting for an instantaneous hot water heater tank, comprising a plug member for detachable association with the top end wall of said tank for communication with the interior thereof, said plug member having a flat surface exterior for mounting of a heat responsive electrical switch thereon in conductive relation therewith, a reduced threaded shank depending from said flat surface plug member for engagement with a complemental opening in the top end wall of the hot water heater tank, there being a bore in said threaded shank member closed by said plug member and open at its bottom end for communication with the tank interior when in assembled engagement therewith, an elongated magnesium rod in anchored attachment at one end thereof with the bore in said threaded shank member of the plug member for suspended support thereof within the hot water heater tank for substantially the internal length thereof, and a thermally responsive electrical switch mounted on the top flat surface of said plug member, said switch adapted to be connected electrically in circuit with an automatic fuel shut-off valve controlling the fuel supply to the burner of the tank, said switch being in direct heat conductive connection with said magnesium rod for effectively rendering said thermally responsive switch in an open or closed position depending upon the temperature of the rod, whereby an effective electrical safety shut-off is provided as a part of an integral unit fitting.

2. The combination set forth in claim 1 wherein the electrically responsive shut-off switch is of the flat heat responsive bellows type for mechanically closing or maintaining the switch open depending upon the temperature of said magnesium rod.

3. The combination set forth in claim 2 wherein the thermally responsive electrical switch, flat surface plug member, and magnesium rod are fixedly and permanently attached in longitudinal axial alignment relative to the latter for assembly as a unit with said tank.


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