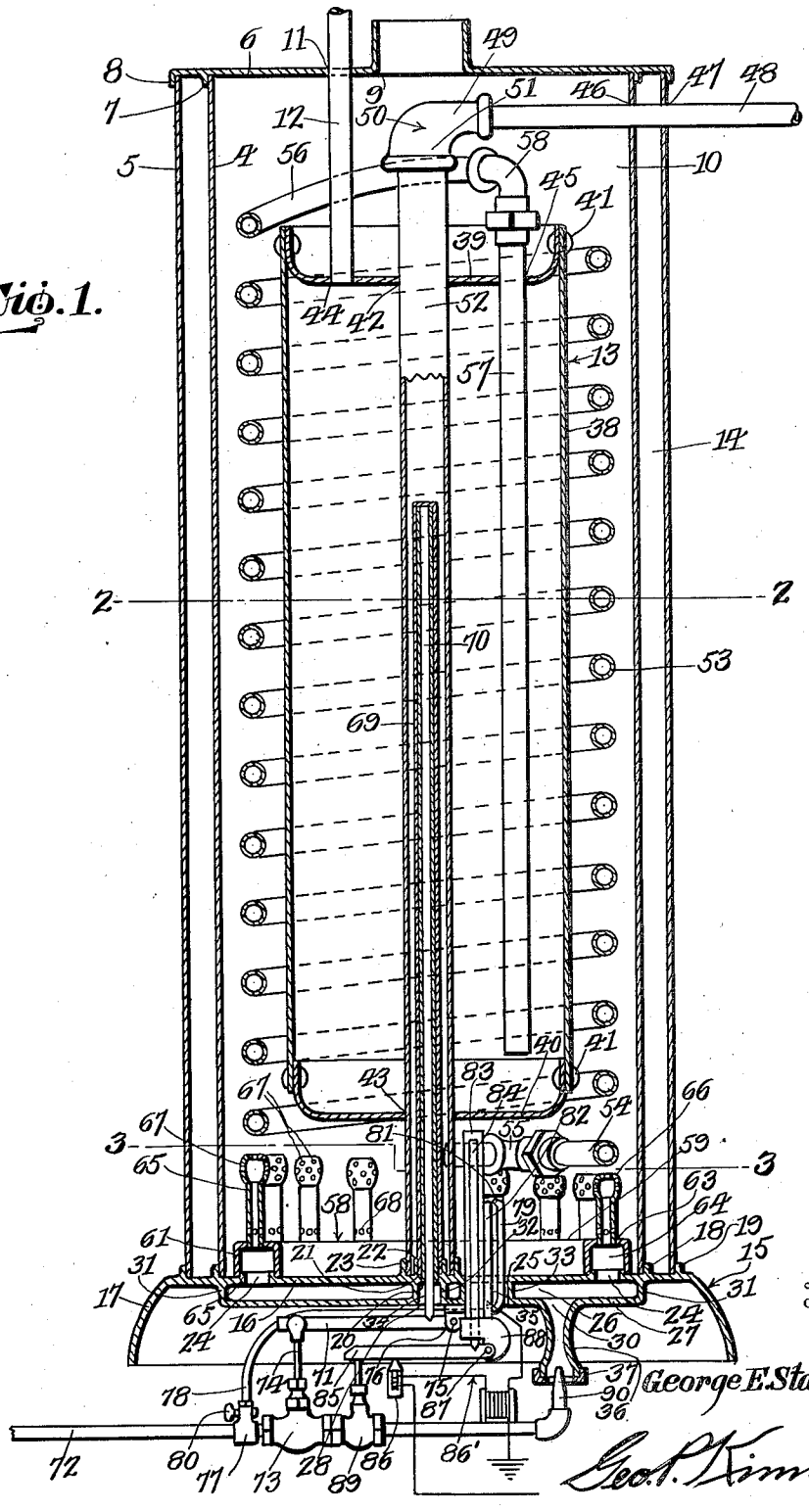
Aug. 13, 1935. G. E. STARKWEATHER 2,011,506

AUTOMATIC STORAGE WATER HEATER

Filed June 4, 1934 2 Sheets-Sheet 1

Fig. 1.



Inventor

George E. Starkweather

Geo. P. Kimmel.

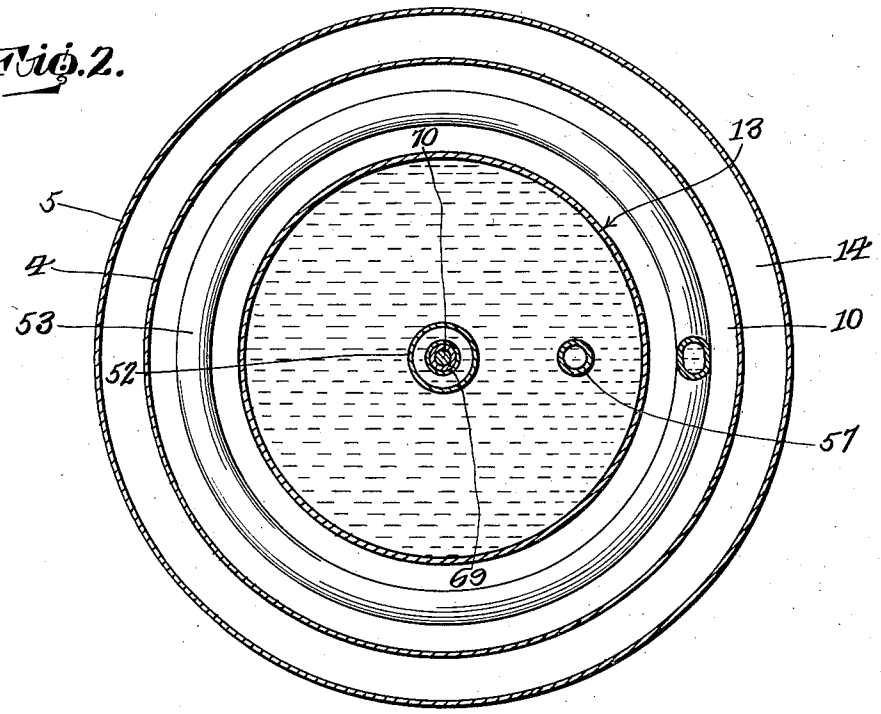
Attorney

Aug. 13, 1935. G. E. STARKWEATHER 2,011,506

AUTOMATIC STORAGE WATER HEATER

Filed June 4, 1934 2 Sheets-Sheet 2

Fig. 2.



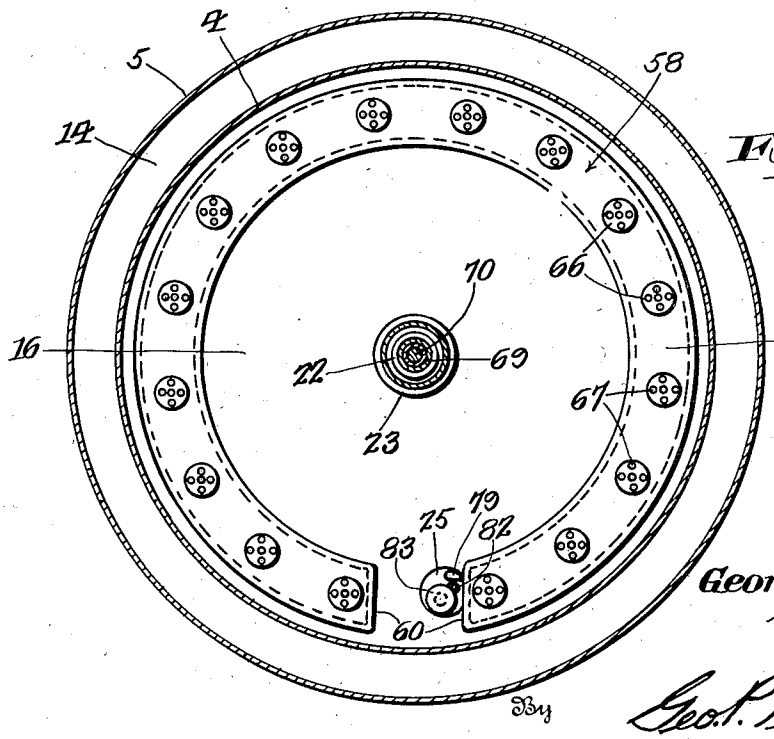


Fig. 3.

Inventor
George E. Starkweather

By Geo. P. Kimmel
Attorney

Patented Aug. 13, 1935

2,011,506

UNITED STATES PATENT OFFICE

2,011,506

AUTOMATIC STORAGE WATER HEATER

George E. Starkweather, Los Angeles, Calif.

Application June 4, 1934, Serial No. 728,985

2 Claims. (Cl. 122—19)

My invention relates to an automatic storage water heater.

The essential objects of the invention are to provide a water heater whereby it will materially reduce the consumption of water heaters now generally employed; for automatically igniting the pilot light in case through some cause, such as a draft it was extinguished; for conveniently removing the burner structure when damaged without removing the boiler; a safe and economic heater that will give years of service; a thermostatic control for the burner and the pilot light for the latter which requires no water pressure; for breaking up the gas more evenly by a free supply of air to and on the passage of the gas to its point of consumption thereby resulting in a fine blue flame; for automatically igniting the pilot light by an electric spark when such light has been accidentally extinguished; and to attain these ends in a strong, durable, compact, readily assembled, thoroughly efficient, conveniently repaired, and comparatively inexpensive structure.

To the above ends essentially, and to others which may hereinafter appear, my invention consists of such parts, and such combination of parts which fall within the scope of the invention as claimed.

In the drawings:—

Figure 1 is a vertical sectional view of my automatic storage water heater.

Figure 2 is a section on line 2—2, Figure 1, and Figure 3 is a section on line 3—3, Figure 1.

Referring to the drawings 4, 5 indicate respectively inner and outer concentrically arranged shells disposed in close spaced relation and of like length. Positioned upon the upper end of said shells is a circular head plate 6 having depending from its lower face a pair of concentrically arranged spaced annular flanges 7, 8. The plate 6 is formed axially thereof with an outlet opening 9 for a heat chamber 10 and an opening 11 adjacent opening 9 for the passage of a hot water conducting-off pipe 12 leading from a water boiler 13. The plate 6 provides the top of the chamber 10. The upper end of shell 4 is positioned within and is abutted by the flange 7 which is disposed circumferentially of shell 4. The upper end of shell 5 is positioned within and is abutted by the flange 8 which is disposed circumferentially of shell 5. The flange 8 depends from the outer edge of plate 6. The flange 7 is positioned in close proximity to flange 8. The flanges 7, 8 maintain the shells 4, 5 in spaced relation to form an insulating space 14.

The shells 4, 5 are mounted on a base structure 15 which may be positioned on or connected to any suitable supporting means therefor, such as the well known stand or supporting legs now generally employed in connection with upright water heaters. The base structure 15 provides the bottom of chamber 10.

The base structure 15 includes a circular plate 16 of greater diameter than plate 6 but arranged in alignment with respect to the latter. The plate 16 at its outer edge merges into a depending annular, outwardly curved rim 17. The upper face of plate 16 is provided with a pair of upstanding spaced circumferentially arranged flanges 18, 19 which align with the flanges 7, 8 respectively. The lower ends of shells 4, 5 have their outer faces abutting the inner faces of the flanges 18, 19 respectively. The plate 16 has axial opening 20 formed with a beveled edge or wall 21. Bordering opening 20 slightly adjacent to edge or wall 21 is an upstanding annular collar 22. Disposed concentrically to collar 22 and integral with the upper face of plate 16 is an upstanding annular collar 23 spaced a short distance from collar 22. The plate 16 in proximity to flange 18 is formed with a circular row of spaced gas intake openings 24 for a burner structure to be presently referred to. The plate 16 in proximity to the flange 18 is formed with an opening 25 which is disposed between a pair of openings 24 (Figure 3). The plate 16 has depending from its lower face integral means to form a gas receiving chamber 26 which discharges through the openings 24 into the burner structure to be referred to.

The said means which provides the chamber 26 consists of a web providing a bottom wall forming part 27 formed with openings 28, 29 and 30, an annular outer wall forming part 31 located outwardly with respect to openings 24, an annular wall forming part 32, and an annular wall forming part 33. The openings 20 and 28 are arranged in alignment and the wall forming part 32 provides a downward and upward continuation of the edges of openings 20 and 28 respectively. The wall forming part 32 provides a passage 34 for a purpose to be referred to. The openings 25 and 29 are arranged in alignment and the wall forming part 33 provides a downward and upward continuation of the edges of the openings 25, 29 respectively. The wall forming part 33 provides a passage 35 for a purpose to be referred to. Formed integral with and depending from the bottom wall forming part 27, as well as registering with opening 30 is an oppositely flared tubular member 36 constituting a gas conductor opening

into the chamber 26. The lower end of member 36 is reinforced by a flange collar 37 anchored to said end.

The boiler 13 is suspended within and is spaced from the top, bottom and side of the chamber 10. The boiler 13 comprises a shell 38 and cup shaped members 39, 40 providing respectively the top and bottom of the boiler. The member 39 is arranged wholly within the upper end of shell 38. The member 40 is arranged within and depends from the lower end of shell 38. Holdfast means 41 are employed to anchor members 39, 40 to shell 38. The members 39, 40 are formed with axial openings 42, 43 respectively. The member 39 is formed with a pair of openings 44, 45 spaced from opening 42. The openings 42, 43 are of greater diameter than the openings 44, 45. The opening 44 is of less diameter than opening 45 and has the inner end of pipe 12 anchored to the wall thereof.

The shells 4, 5 in promixity to their upped ends have aligning openings 46, 47 respectively through which extend a cold water supply line 48 into chamber 10. The line 48 is arranged above boiler 13 and opens at its inner end into the reduced horizontal leg 49 of an inverted L-coupling 50. The vertical leg of the latter is designated 51 and is of greater diameter than leg 49. Extending through the openings 42, 43 and seating at its lower end upon the plate 16, as well as abutting the inner face of collar 23 is a vertically disposed tubular water conductor 52. The latter extends above member 39 and is connected to the vertical leg 51 of coupling 50. The cold water from line 48 is supplied to conductor 52 and the latter conducts the water through boiler 13. The water as it passes through the conductor is heated from the hot water in boiler 13 and also from the heat within the lower portion of chamber 10. Surrounding the boiler 13, as well as being disposed above and below the latter is a series of water conducting coils 53 which are completely arranged in chamber 10. The lower coil 54 of the series is connected to and communicates with the lower part of conductor 53, as at 55. The upper coil 56 of the series opens into the upper end of a vertically disposed water supply pipe 57 for the boiler 13. The coupling connection between coil 56 and pipe 57 is indicated at 58. The pipe 57 extends to a point in closed proximity to the bottom of and discharges into boiler 13. The pipe 57 passes through opening 45. The lower end of conductor 52 is closed by plate 16.

The burner structure indicated generally at 58 includes a split annular body part 59 of inverted channel shape cross section. The ends 60 of said body part are closed and arranged in opposed spaced relation (Figure 3). The opening 25 is positioned in close proximity to one of said ends 60. The body 59 is formed of a pair of spaced side walls 61, an open bottom and a top wall 62 formed throughout with a row of equidistant spaced openings 63. The body part 59 is seated upon plate 16 with the openings 24 in the latter communicating with a gas chamber 64 provided by said body part. The plate 16 has raised portions 65 for setting body part 59 in position relative to openings 24 and to prevent its shifting upon plate 16.

Secured in each opening 63 is a vertically disposed burner tube 66 terminating at its upper end into a hollow head 66 formed with a series of spaced jet openings 67. The head 66 is of greater diameter than that of the tube. Each side of the tube 65 in proximity to the top wall 62 of body part 59 is formed with a plurality of air intake openings 68.

Arranged within the conductor 52 is a vertically disposed thermostatic element 69 of tubular form which is closed at its upper end and has its lower end anchored to plate 16 inwardly of the collar 22. Arranged within the element 69 is a vertically disposed shiftable rod 70 which has its lower portion extending through the passage 34. The rod 70 preferably is constructed of porcelain and is shifted on the contraction and expansion of element 59. When shifted on the contraction of element 69 it functions to apply pressure to a lever 71 for the purpose of normally maintaining a gas supply line 72 open to provide for a supply of gas to the burner structure. Interposed in line 72 is a cut-off 73 having a stem 74 which is attached to lever 71. The construction of cut-off 73 is such that when pressure is not applied to lever 71 the cut-off will automatically close. The rod 70 is released from pressure applying position with respect to lever 71 on the expansion of element 69. The latter is arranged below the wall forming part 27, and is pivotally connected at one end, as at 75 to apertured means 76 depending from part 27. Interposed in the line 72 at a point rearwardly of cut-off 73 is a T-coupling 77 to which is attached a bypass pipe 78 which extends up through passage 35 and forms a pilot light burner as at 79. The coupling 74 has a cut-off 80. Associated with the angle-shaped upper end 81 of burner 79 is an electrode 82, the upper end of the latter being spaced from end 81 to provide a spark gap. Extending through the passage 35 is a thermostatic element 83 for shifting a pressure applying rod 84. The element 83 is of that type to flex when hot to elevate rod 84 to non-pressure applying position and when cold to shift rod 84 to pressure applying position with respect to a lever 85 for the purpose of shifting the latter in a direction to close a controlling switch 86 of a sparking circuit 86'. The lever 85 is pivotally connected, as at 87 to an apertured bracket 88 carried by the rim 17. The rod 84 passes through bracket 88 to engage lever 85. The latter also functions when pressure is applied thereto to close a safety cut-out 89 which is interposed in the line 72. The cut-out 89 is of the form to automatically assume open position when pressure is not applied to lever 85. The line 72 includes a gas discharge nozzle 90 which extends upwardly into the tubular member 36.

In case the pilot light has been accidentally extinguished, the thermostat 83 will act upon rod 84 whereby pressure is applied to lever 85 for the purpose of operating the controlling switch 86 to close circuit 86' whereby a spark will be created and the pilot light ignited.

The thermostatic element 69 in connection with the rod 70 functions to maintain the gas supply open to the burner structure during the normal condition of operation of the water heater.

The water boiler 13 constitutes a water heating chamber, as well as a storage for hot water, after the water has been conducted therethrough by the conductor 52, circumferentially thereof by the coils and downwardly therein by the pipe 57. The water is heated on its passage through the boiler by the hot water in the latter, by the coils in the chamber 10 and as it travels downwardly in pipe 57 for discharge into the boiler.

What I claim is:—

1. In an automatic storage water heater, a heat chamber, heating means within the lower

portion of the latter, a boiler suspended in said chamber, a water conductor extending through said boiler axially of and projecting above and depending below said boiler, a cold water supply means opening into the upper end of said conductor, a water coil encompassing said boiler and) communicating at its lower end with said conductor below the boiler, a vertically disposed water conducting pipe extending in and opening into the boiler, said pipe being connected at its upper end to the upper end of said coil, and a hot water outlet pipe for the boiler.

2. In an automatic storage water heater, a water boiler providing a water storage, an enclosure therefor arranged in spaced relation thereto, a gas burner within said enclosure, a series of water conducting coils within the enclosure and circumferentially disposed with respect to said boiler, water conducting means leading from a cold water supply and closed to, disposed axially of and depending from said boiler, said conducting means being extended above said boiler, means for establishing communication between the lower coil of said series and said conducting means, a water conducting pipe discharging into said boiler, and means for establishing communication between the upper coil of said series and said pipe exteriorly of the boiler.

GEORGE E. STARKWEATHER.