

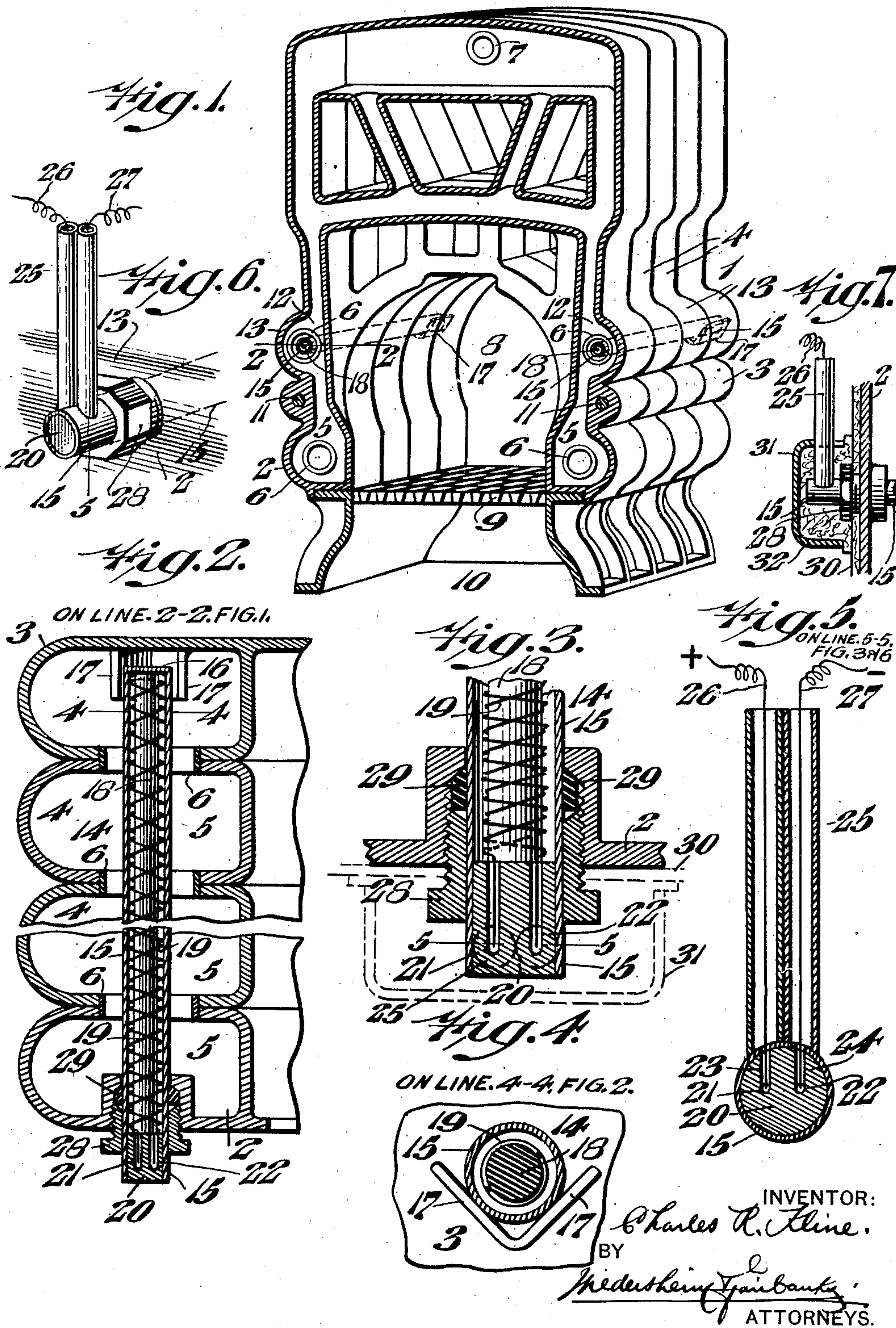
Nov. 18, 1924.

1,515,954

C. R. KLINE

COMBINATION ELECTRIC AND COAL BOILER

Filed Feb. 14, 1923





# UNITED STATES PATENT OFFICE.

CHARLES R. KLINE, OF READING, PENNSYLVANIA.

COMBINATION ELECTRIC AND COAL BOILER.

Application filed February 14, 1923. Serial No. 618,890.

*To all whom it may concern:*

Be it known that I, CHARLES R. KLINE, of the city of Reading, county of Berks, State of Pennsylvania, have invented a new and useful Combination Electric and Coal Boiler, of which the following is a specification.

My invention relates to a novel construction of a combined electrically heated and coal heated boiler, wherein the latter may be composed of sections held in assembled position by any suitable means, the interior of said sections being heated by a coal grate, while the water legs or water spaces of the boiler are provided preferably on each side with electrically heated units or elements, which are constructed and supported, so as to provide for expansion and contraction with respect to the boiler sections in a novel manner.

It further consists of a novel construction of a sectional boiler, having the water legs or water spaces provided with electrically heated units, whose outer ends are constructed and insulated in a novel manner, the interior of said sections being provided with a coal grate, whereby either coal or electricity may be employed independently or simultaneously as the heating medium or agent.

It further consists of a novel construction of an electrically heated unit or element and a novel manner of assembling and supporting the same and its adjuncts with respect to the boiler sections to be heated.

It further consists of a novel manner of supporting the ends of the electrically heated unit, whereby the requisite expansion and contraction is permitted and leakage of the water from the outer section of the boiler is prevented.

It further consists of other novel features of construction and advantage, all as will be hereinafter set forth and pointed out in the claims.

For the purpose of illustrating my invention, I have shown in the accompanying drawings forms thereof which are at present preferred by me, since they will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and

organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a perspective view of a sectional electrically heated boiler embodying my invention, the front boiler section being sectioned vertically to show the collocation of the electrically heated units with respect to the water spaces or water legs of the boiler.

Figure 2 represents on an enlarged scale, a section on line 2—2 Figure 1.

Figure 3 represents, on an enlarged scale, the outer end of the heating unit seen in Figure 2, showing the manner of assembling the electrical heated unit and its casing, within the outer boiler section.

Figure 4 represents on an enlarged scale a vertical section on line 4—4 Figure 2, showing the manner of supporting the inner end of the casing of the electrical heating element.

Figure 5 represents a section on line 5—5 Figure 3.

Figure 6 represents a perspective view showing the outer end of a heating element and its adjuncts.

Figure 7 represents a sectional view of the end of one of the electrically heated units showing also an insulating covering door therefor.

Similar numerals of reference indicate corresponding parts.

Referring to the drawings:—

It will be understood that my invention, in its broad aspects, is capable of adaptation to a horizontal or a vertical sectional boiler, and in the present instance I have shown the same in conjunction with a vertical sectional boiler, composed of a series of vertical sections, which are tied together by side rods, the water communication between the sections being effected by means of nipples, as is customary. In illustrating the adaptation of my invention to this type of boiler, I have shown a sectional boiler 1 as composed of the front section 2, a rear section 3 and the intermediate sections 4, the number of which latter may be increased or diminished according to requirements.



5 designates the upright water leg or water jacket at each side of the sections, and the water communication between the various sections is effected by means of the side nipples 6, and the upper series of central nipples 7. Between the water legs 5 is located the combustion chamber 8 having the grate 9 and the ash pit 10.

11 designates horizontally disposed rods, which hold the various sections in assembled position. In adapting the water holding sections, of the conventional type to my invention, I preferably form on each side thereof the enlarged water holding chamber 12 in each water leg, which is effected by bulging out the outer wall of the section, as indicated at 13, and within this chamber 12 on each side, I locate the heating element or unit 14, which comprises the metallic or other casing or tube 15, having its inner end closed as indicated at 16 and supported upon the V-shaped lug or shelf 17, which may be cast upon or secured to the interior of the rear section 3. Within the tube 15, I locate the core 18, which is made of any suitable material and around this core, I wind one or more of the resistance coils or electrically heated elements 19. The outer end of the tube 15 is closed by the porcelain or other non-conducting plug 20, which has the horizontal channels or passages 21 and 22 therein, which serve as conduits for the ends of the conductors and merge into the vertical passages 23 and 24, respectively, as will be understood from Figure 5. The plug 20 has a tight or driving fit in the outer end of the pipe or casing 15, so that air is excluded from the latter. Above or upon the outer end of the horizontal pipe 15, I locate the pair of vertical insulating pipes 25 in which are located the terminals 26 and 27 of the conductors or wires which form the heating element so that they will be properly insulated and protected. It will be seen that the inner end of the casing 15, by reason of its manner of support on the V-shaped shelf 17, is free to move slightly longitudinally to provide for expansion and contraction, and in order to provide for expansion at the outer end of the casing 15, I employ the construction seen in Figures 2 and 3, wherein the outer end of the tube 15 is located in a stuffing box composed of the gland 28 and the packing 29, it being apparent that when said gland 28 is tightened, there will be no leakage of water from the front section 2 and, at the same time, there will be provided means for permitting the expansion of the outer end of the tube 15 of the electrically heated element or unit 14.

It will be understood that the conductors 26 and 27 are provided with an electric switch or button or controlling device of

any suitable or conventional type, so that the circuit of the resistance coil or coils 19 can be opened and closed, as may be desired.

The operation is as follows:—

When it is desired to heat the heater by coal, the latter is supplied to the grate 9 in the usual manner.

In case of a scarcity of coal and it is desired to heat the heater by electricity, it is only necessary to close the circuit, formed by the conductors 26 and 27, whereupon the heating coil or resistance 19 will at once become highly heated, and by reason of its position within the water legs or jackets 5 of the boiler, the heat of the electrical elements will be instantly applied to the water in the water legs and an effective circulation will be at once created.

It will thus be seen that by my invention I am enabled to heat a sectional boiler of the conventional type either by electricity or coal or both simultaneously or independently and in case of the scarcity of coal, electricity which is usually available in modern homes, may be employed solely as the heating medium.

By my novel manner of supporting the inner and outer ends of the electrical heating units or elements, it is apparent that ample provision is made for expansion or contraction of the heating unit or element, and by the provision of the stuffing box at the front of the front section, provision is made for permitting expansion outwardly of the heating elements, and, at the same time, preventing any leakage of water from the front section.

The entire boiler is preferably provided with a covering of nonconducting material, the portion of the latter on the front section being indicated at 30, Figure 7, and the outer ends of the electrical heating elements are insulated by a door 31 provided with a nonconducting lining 32, which may be hinged and locked in position in any suitable manner, as seen in full lines in Figure 7, and in dotted lines in Figure 4. While I have but one electrical heating element in each water leg, it will be apparent that more may be employed and they may be located higher or lower in the water legs, as may be desired.

It will be understood that the casing 15 containing the heating element is completely immersed in or surrounded by water, as will be understood from Figure 2, and that the electric heating element or unit may be inserted into or removed from the casing according to requirements without disturbing the position of the casing in the boiler, whereby a burnt out unit can be readily removed without emptying the water out of the whole heating system, including the boiler, radiators and pipes common thereto. While I have shown the core of the heating



unit and the outer casing 15, as being cylindrical, it will be apparent that other shapes may be employed.

It will be further understood that the dimensions of the water chamber in which the casing 15 is located, will be enough larger than the outer dimensions of said casing so that a free circulation of the water to be heated will be permitted at all times around the heater casing and within the water legs.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. In a device of the character stated, water holding sections, provided with a grate, an electrical heating element positioned in said sections, and comprising a casing, surrounded by water except at its front end, and containing a core and a resistance coil, a support on one of said sections for said casing, the outer end of the latter protruding through the front section and movably secured therein, and a tightfitting closure for the outer end of said casing.

2. In a device of the character stated, water holding sections, provided with a grate, an electrical heating element positioned in said sections, and comprising a casing, surrounded by water except at its front end, and containing a core and a resistance coil, a support on one of said sections for said casing, the outer end of the latter protruding through the front section and movably secured therein, and a tight fitting closure for the outer end of said casing, in combination with a gland and packing for the outer end of said casing.

3. In a device of the character stated, water holding sections, provided with a grate, an electrical heating element enclosed in a casing immersed in water, positioned in said sections, and comprising a casing closed at its inner end, and containing a core and a resistance coil, an internal support on one of said sections, receiving the inner end of said casing, a stuffing box in the outer water holding section, through which the outer end of said casing protrudes, a closure for the outer end of said casing having passages therein for the ends of the resistance coil and pipes on the outer end of said casing composed of insulating material, through which the terminals of said resistance coil pass.

4. In a device of the character stated, water holding sections, provided with a grate, an electrical heating element positioned in said sections, and comprising a casing immersed in water, closed at its inner end, and containing a core and a resistance coil, an internal support on one of said sections, receiving the inner end of said casing, a stuffing box in the outer water holding section, through which the outer end of said casing protrudes, a closure for the outer

end of said casing having passages therein for the ends of the resistance coil and pipes on the outer end of said casing made of insulating material, through which the terminals of said resistance coil pass, in combination with an insulating door, covering the end of said heating element.

5. In a device of the character stated, a sectional boiler composed of front and rear and intermediate sections having water legs, joined by laterally disposed nipples, in such a manner as to permit the free circulation of water in and through the chamber so formed, an electric heating element passing through said nipples, and comprising an outer casing containing a resistance coil, a trough shaped shelf on the interior of said front section and supporting the inner end of said casing, a stuffing box in said front section through which the front of said casing passes, a closure for the front of said casing and a protecting casing for the terminals of said coil.

6. In a device of the character stated, a sectional boiler composed of front and rear and intermediate sections having water legs, joined by laterally disposed nipples, in such a manner as to permit the free circulation of water in and through the chamber so formed, an electric heating element passing through said nipples, and comprising an outer casing containing a resistance coil, a trough shaped shelf on the interior of said rear section and supporting the inner end of said casing, a stuffing box in said front section through which the front of said casing passes, a closure for the front of said casing and a protecting casing for the terminals of said coil, in combination with an insulated door for closing the front end of the electric heating element.

7. In a device of the character stated, an electric heating element, comprising a metallic tube closed at one end, and having a tight fitting non-conducting plug at the other end provided with horizontal and vertical channels, a core in said tube, a resistance coil on said core, the terminals of said coil being contained in said channels and upright pipes on said tube made of insulating material through which said terminals pass.

8. In apparatus of the character stated, the combination of a compartment containing liquid the temperature of which conventionally is raised by combustion, with an electrical heating element the major portion of which is immersed in said liquid for direct heating thereof, whereby the two elements of heat may be selectively and independently employed with substantially equal temperature raising results.

9. In apparatus of the character stated the combination of a compartment containing



liquid, the temperature of which conventionally is raised by combustion, with an electrical heating element removably introduced through a wall of said compartment  
5 and immersed in the liquid contained therein, the terminal portion of said heating element, however, being located substantially

without said compartment and means for preventing leakage of liquid at the place of penetration of said heating element.

CHARLES R. KLINE.

Witnesses:

E. HAYWARD FAIRBANKS,  
C. D. McVAY.