

W. KANE.
BOILER.

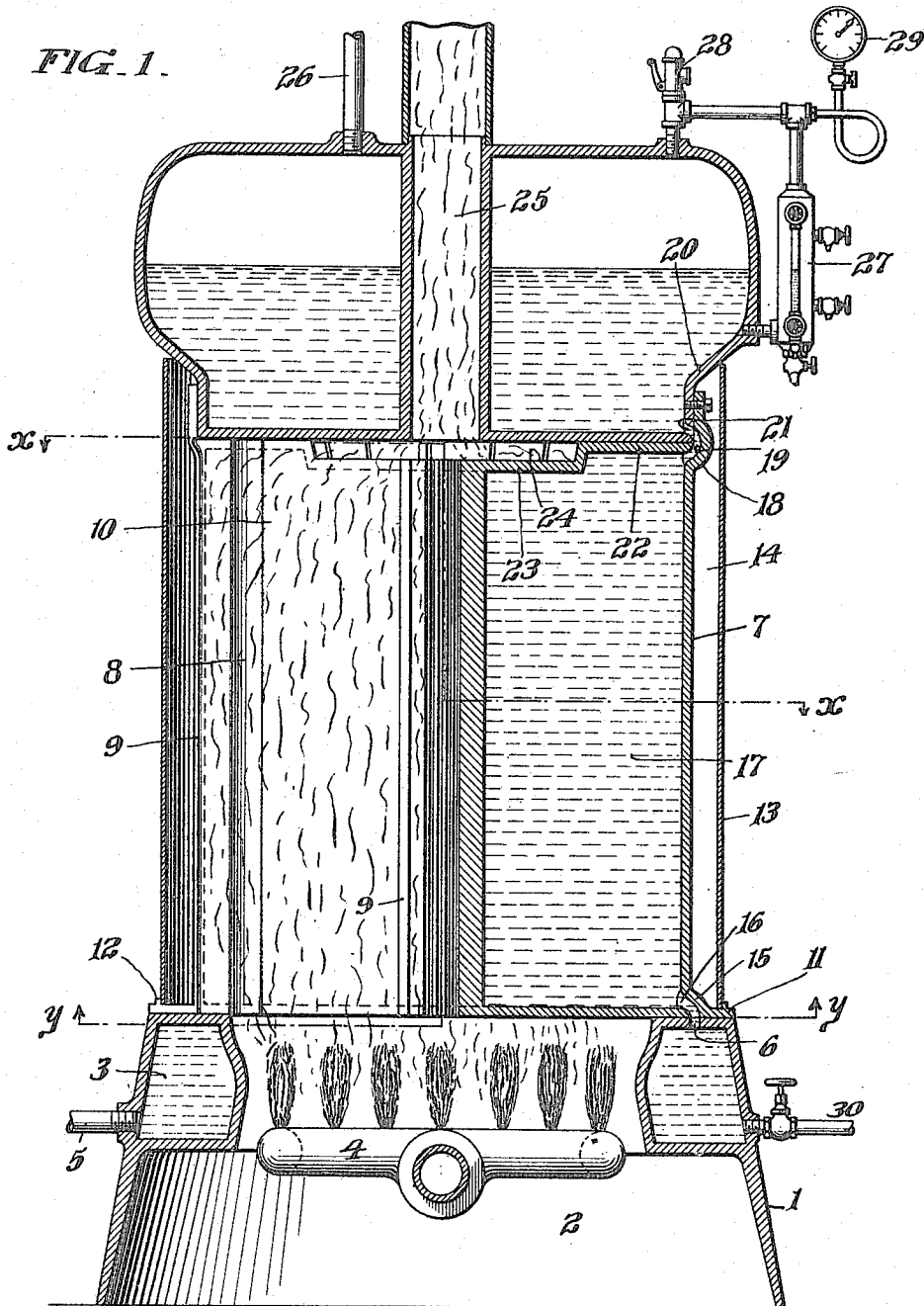
APPLICATION FILED OCT. 10, 1913.

Patented Jan. 5, 1915.

2 SHEETS-SHEET 1.

1,123,750.

FIG. 1.



WITNESSES

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2 SHEETS-SHEET 2.

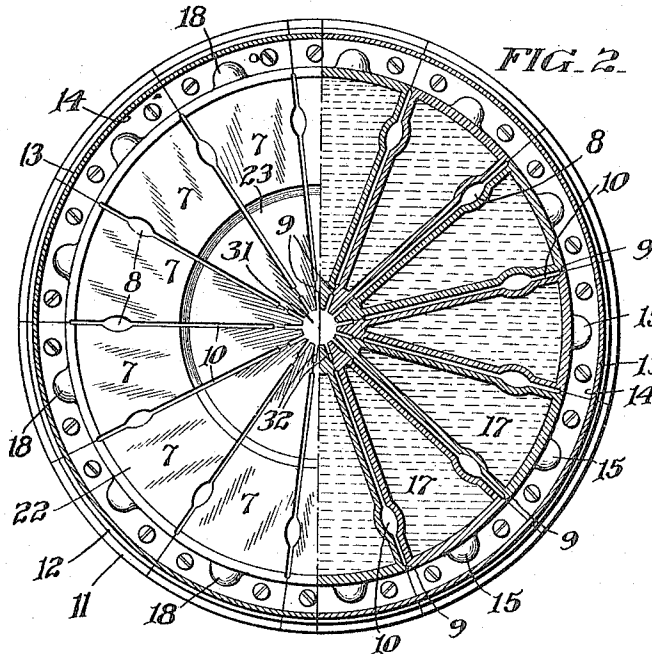


FIG. 2.

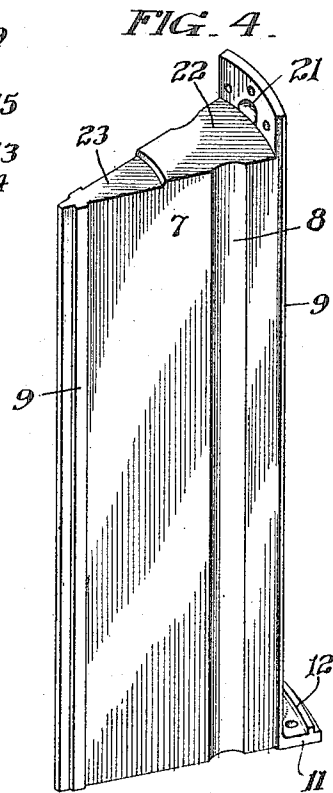


FIG. 4.

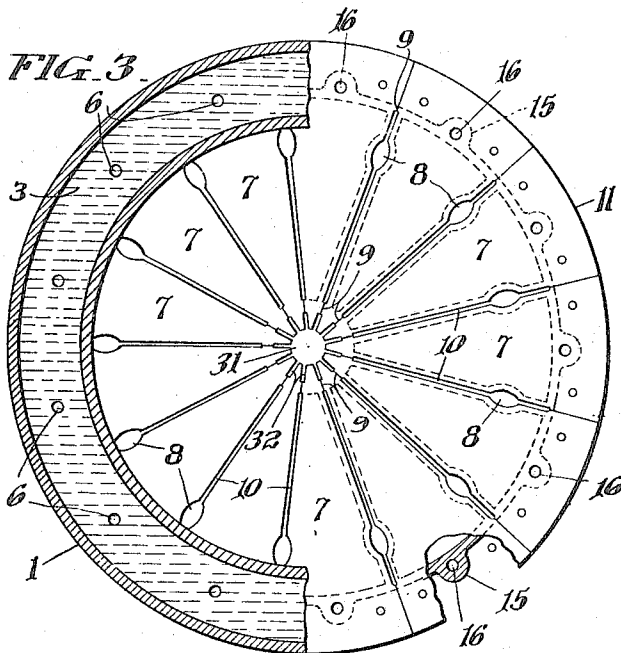


FIG. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

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BOILER.

1,123,750.

Specification of Letters Patent.

Patented Jan. 5, 1915.

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To all whom it may concern:

Be it known that I, WILLIAM KANE, a citizen of the United States, and resident of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Boilers, of which the following is a specification.

This invention relates to generators and more particularly to a boiler or heater of low pressure capacity for use with small units or powers whereby gas or other hydro-carbon fuel may be economically used as the heating medium.

My invention has for an object, to provide a generator or boiler in which the water space is sub-divided into a plurality of units between and within which the heated products of combustion are caused to pass to provide for the most effective heating of the water with a minimum loss of heat units.

It has for a further object, to provide a boiler in which the several adjuncts or sections providing the sub-divided water space are coöperatively arranged with respect to each other and are removable with respect to each other and therefore afford a means whereby a damaged or broken unit may be quickly and expeditiously repaired or replaced by a perfect section.

My invention further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings the form thereof which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, but it is to be understood that the several 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.

Referring to the drawings:—Figure 1 represents a sectional elevation of a boiler embodying my invention; Fig. 2 represents a section on line $x-x$ of Fig. 1 looking downward; Fig. 3 represents a section on line $y-y$ of Fig. 1 looking upward; and Fig. 4 represents a perspective of one of the boiler leg sections.

Similar numerals of reference indicate corresponding parts.

1 designates the base of the boiler, the

same forming a combustion chamber 2 and being provided with an annular water compartment 3 which is preferably exposed to the heat of the burner 4 so that the water supplied through the inlet pipe 5 may receive an initial heating. This annular compartment also constitutes a mud drum or chamber. It will be understood that the burner 4 may be of any desired type, and I have in the present instance shown a conventional type of circular gas burner. The boiler is adapted for use with any convenient source of heat or kind of fuel and I do not restrict myself in this respect. In connection with the annular water compartment 3 of the base it will be noted that a plurality of openings 6 are provided in the upper portion thereof, the said openings being spaced apart a suitable distance and definitely arranged with respect to the boiler leg sections which will later be described; the function of these openings 6 being to form a passageway or means of communication between the annular compartment and the water space in the leg sections 7 of the boiler proper.

The lower portion of the base forms a support for the boiler, the latter in the present instance being made up of the annular base compartment 3, a plurality of the leg sections 7 and dome section 20. The leg sections 7 are substantially similar and therefore the description will be limited to the construction of one of the sections, but will be understood as applying to each of them. The leg section 7 comprises a hollow casing, having in cross section substantially the shape of a sector of a circle, and one or both sides provided with a longitudinally disposed groove 8 which runs the vertical length of the section and adapted to form a more or less free passageway for products of combustion. Each side of the leg section 7 is further provided with a pair of flanges 9, both running throughout the length of the section and forming between them a passageway 10 for the products of combustion; this passageway, as will be apparent by reference to Fig. 2, including also the passageway formed by the groove 8.

The section 7 is provided at the bottom with an external flange 11 by means of which it is securely bolted or otherwise fastened to the base 1, and upon the said flange 11 I preferably provide a rib 12 which

serves as a positioning abutment for the outer casing 13 which incloses the entire boiler structure. This outer casing, as will be apparent from Fig. 1, is suitably spaced therefrom in order to form a dead air compartment 14 to retain the radiated heat about the respective sections. This outer casing also acts as an ornamental covering and shields the joints. It may be omitted if desired. Adjacent the flange 11, the section 7 is provided with an offset portion 15 which is provided with an orifice 16 opening through the flat bottom surface and forming a communication between the water chamber 17 of the leg section and the annular compartment 3 of the base, the said orifice 16 being in alinement with the respective opening 6 in the base. The upper end of the leg section 7 has a similar offset, shown at 18, having an opening or orifice 19 therethrough for the purpose of conducting the water from the leg chamber 17 into the interior of the dome 20, the latter, as will be understood, being provided with radial openings 21 alined with the respective openings 19 of the several leg sections 7. The top 22 of the leg section 7 is preferably flat to serve as a suitable support for the dome 20, but is recessed as shown at 23 so that in assembled condition of the parts a flue chamber or passage 24 will be provided between the top of the sections 7 and the bottom of the dome section, in order to direct the products of combustion to the flue 25 which, in the present instance, passes through the dome 20 and is partially surrounded by water or steam as the case may be. The offset portion 18 is formed in an upwardly extending flange which is curved on its inner face to tightly fit the perimeter of the dome section and to which it is suitably bolted.

26 is a steam pipe and may lead from the dome to any suitable point for the purpose of conducting steam to the engine, radiator, heater, presser or the like. The dome 20 is preferably provided with a suitable water gage 27 connected with the dome 25 and connected in the usual manner, above and below the normal water level, while 28 designates a safety valve of any desired type, and 29 the usual steam gage.

30 designates a valve controlled discharge pipe connecting with the annular chamber of the base and adapted for draining the boiler when desired, or for blowing off the same for cleansing.

In assembling the generator the several leg sections 7 are placed upon the base 1, each with its orifice 16 alined with one of the openings 6 of the water chamber of the base and are securely fastened in place. In assembled condition, it will be apparent by reference to Fig. 2, that the juxtaposed flanges 9 of the respective sections abut one

another, thus forming the aforesaid narrow vertical passageways 10 for the products of combustion ascending from the furnace chamber 2, while the end portions of the sections adjacent the center provide a small central flue or passageway 31, having radial openings 32 which permit the heated products to circulate about the central end portion of each section 7 and thus increase the heating capacity of the boiler. This passage 31 is more particularly to provide space for the radial expansion of the leg sections 7. The products of combustion leaving the furnace chamber 2 thus pass through a plurality of comparatively thin vertical passageways 10 between the leg sections 7 and in each of which is, preferably, an enlarged channel 8. The products may pass upwardly through the central opening 31 and its radial passageways and may unite with the products passing through the channels 10 and the chamber 24, from which they all discharge by way of the flue 25 through the dome. I prefer the circular form for the boiler and the curved outer walls of the leg sections 7, but it is manifest that such circular form would be supplied by any shape which gives approximately a circular form. No skilled labor is required to set up the boiler or to remove and replace a defective section should such repairs be, at any time, necessary. The boiler may be of any size desired and the number of leg sections 7 may be varied to suit the diameter of the boiler and the heating efficiency required. The water enters by way of the pipe 5, circulates through the annular base chamber 3, ascending through the comparatively small openings 6 and orifices 16 into the several leg sections 7, which are normally maintained full of water, and from these leg sections it passes through the comparatively small openings 18 and 21 into the dome 20, where the desired water level is maintained.

It will now be apparent that I have devised a complete, unitary heating structure wherein the water is divided into a number of units which are subjected on either side to the heat of the products of combustion as they are passed from the furnace chamber to the stack. By this construction I have provided a comparatively large heating surface; and by utilizing a plurality of comparatively large channels or passageways located adjacent the outer circumference of the water units, I have provided for a substantially free flow of the products of combustion without choking effect. It will furthermore be apparent that, by directing the products of combustion across a portion of the top of the sections 7, there is an opportunity for an increased absorption of heat units at this part of the said sections 7 and also along the bottom of the dome 20. It

will also be apparent, by constructing each section as a complete unit that it is a very simple matter to remove, repair or replace any of the sections without the necessity of entirely disassembling the boiler structure, this being made possible by having all of the bolted joints upon the outside of the boiler. It will further be understood that, while I have shown and described my novel structure used in connection with a steam boiler, I do not wish to be limited to that particular use, since it will be apparent that equally efficient results may be obtained by utilizing it as a water heater for small hot water systems or the like.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention, or sacrificing any of its advantages.

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

1. In a device of the character stated, a boiler structure providing a combustion chamber and an encircling water leg, a plurality of radially arranged sections located above said combustion chamber and provided with means for circulating the water through said sections and water leg, each of said sections having a vertical groove therein at each side, said grooves being respectively juxtaposed to the grooves of an adjacent section to form passages for products of combustion, all of said passages being in communication with said combustion chamber, and the inner ends of said sections being spaced apart to provide free expansion and contraction of the respective sections.

2. In a boiler, a leg section consisting of a hollow casting of substantially sector shape in cross section and having its radial side faces provided with vertical flanges to form a shallow groove, and also having the said side faces recessed vertically near the outer portion of the section to form deeper portions of said groove, the bottom of said section provided with an outwardly directed flange and with a water passage opening into the interior of the section through the flange, and the upper portion of the section provided with a flange at its outer part at

right angles to the base flange and providing a water passage through the flange communicating with the interior of the section.

3. In a boiler, the combination of a base forming a combustion chamber having a water compartment, a plurality of water leg sections mounted on said base in communication with the water space thereof and radially arranged to form a central clearance passage or space for expansion, each of said water sections having a vertical groove therein juxtaposed with respect to the groove of an adjacent section to form radially arranged passages for products of combustion, all of said passages communicating with said combustion chamber, a dome mounted on said leg sections and having communication with each of said sections, and also having a flue in communication with all of said passages.

4. In a boiler, the combination of a base forming a combustion chamber having an annular water compartment having a plurality of openings therein at its top, a plurality of water sections mounted on said base each section having a downwardly opening orifice in the bottom adapted to align with one of said openings in the base, a dome mounted on said leg sections having a plurality of radial openings respectively aligned with said leg sections and in communication therewith at right angles to the bottom openings.

5. In a sectional boiler, a plurality of sections secured side by side at their outer portions in circular arrangement, and each section consisting of a hollow casting of substantially sector shape in cross section and having radial side faces to be heated, the said section provided with water passages at top and bottom opening into the interior of the section, and by which communication may be provided between the sections, the radially inner ends of the sections being free to move radially under expansion and contraction of the section.

6. In a sectional boiler, a plurality of sector shaped sections bolted together at their outer parts so as to be held in circular arrangement and with vertical narrow spaces between the sections for products of combustion, said sections in communication with each other and free at their inner portions so as to be moved radially under expansion and contraction.

In testimony of which invention, I hereunto set my hand.

WILLIAM KANE.

Witnesses:

R. M. HUNTER,
HORACE D. REEVE.