G. KINGSLEY.

WATER TUBE BOILER.

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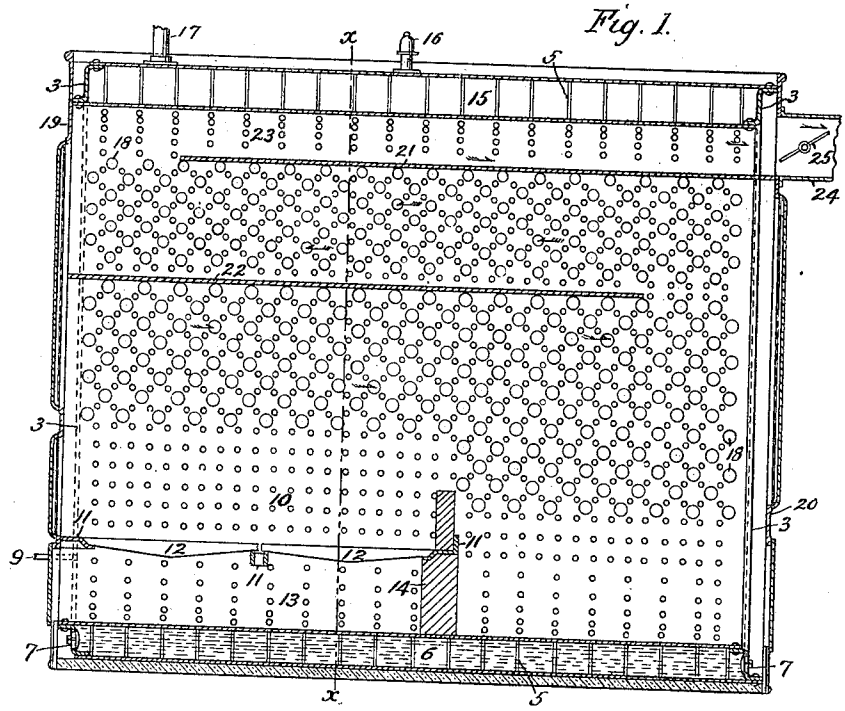
1,236,574.

Patented Aug. 14, 1917.

Fig. 1.



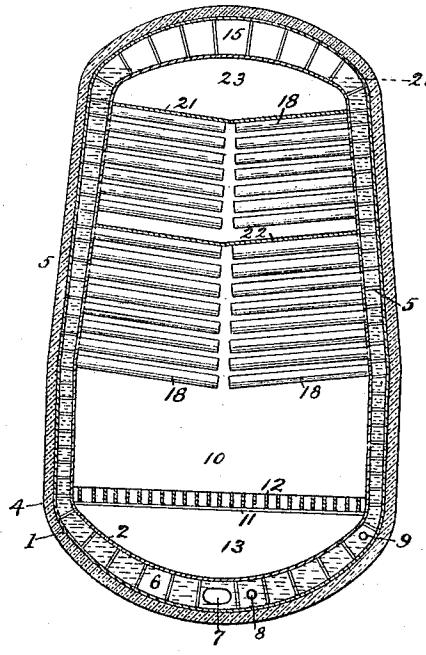


Fig. 2.

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UNITED STATES PATENT OFFICE.

GEORGE KINGSLEY, OF NUTLEY, NEW JERSEY.

WATER-TUBE BOILER.

1,236,574. Specification of Letters Patent. Patented Aug. 14, 1917.

Application filed April 15, 1913. Serial No. 761,263.

To all whom it may concern:

Be it known that I, GEORGE KINGSLEY, a citizen of the United States, and resident of Nutley, in the county of Essex and State of New Jersey, have invented certain new and useful Water-Tube Boilers, of which the following is a specification.

The invention relates to improvements in water-tube boilers of the general type disclosed in my earlier Patent No. 939,031, dated Nov. 2, 1909, and the objects of the invention are to provide a construction that not only includes the particular advantages therein disclosed, but also provides for a structure more self-contained and adapted to resist the vibrations occasioned in marine use; and a further object includes an arrangement of parts whereby the heat is more fully utilized to effect an additional superheating and drying action upon the steam.

In describing the invention in detail, reference is had to the accompanying drawings, forming a part of this specification, and wherein like characters of reference are used to designate corresponding parts throughout the several views, and in which:

Figure 1 is a longitudinal vertical section of the improved boiler embodying my invention; and Fig. 2 is a transverse vertical section of the same along the broken line *x*—*x*, Fig. 1, shown looking toward the front of the boiler.

As shown in the drawings, the boiler is formed with an outer shell 1 and an inner shell 2, the two being spaced apart, connected together at their opposite ends by the heads 3, to constitute therebetween a continuous water and steam compartment, covered exteriorly with the usual non-conducting material 4 to prevent undue radiation of heat. With respect to the interior of the boiler, the shells thereof at their upper and lower portions are convexed to afford sufficient strength for the resistance of the internal steam pressure, which pressure is further resisted throughout the compartment by the usual arrangement of stay-bolts 5.

In the disposition of the shells with respect to each other the lower portion of the compartment constitutes the nominal mud-drum 6, in which space the water is comparatively quiet and allows the collection of sediment or impurities deposited therefrom. In communication with this space the heads thereof are provided with the ordinary covered cleaning holes 7, blow-off connection 8, and feed-water-supply pipe 9. Continuing above the mud-drum the compartment forms two vertical oppositely-disposed side water-walls, comprising the side walls of the fire-box 10, to the inner shells of which are fixed the bearer-bars 11 for the support of the grate-bars 12, the space below the latter forming the ash-pit 13, closed at the rear by the wall 14. The side water-walls as continued above the fire-box section are inclined inwardly toward each other, the respective shells of each being somewhat outwardly flared in an upward direction to provide a gradually increasing area for a free escape of the generated steam. At the top, the side water-walls unite and form a steam chamber or reservoir 15, provided with the usual safety-valve 16 and steam-discharge pipe 17.

Steam-generating tubes 18, having closed inner ends, are connected by screw-threads to the inner shell of the boiler and lead to the sections of the compartment comprising the side water-walls, extending from the fire-box to the steam chamber. These tubes are inclined downwardly toward their free ends, and spaced in staggered relation with the stay-bolts to permit the free escape of steam generated therein.

At the front and rear, the boiler is respectively provided with frames 19 and 20, which are connected to the heads of the side water-walls and are provided with the usual doors for communicating with the interior of the boiler. Supported upon the tubes within the boiler are the upper and lower baffle-plates 21 and 22, respectively. At one end, these plates are spaced apart from the frames, as shown, and serve to direct the flow of the heated products of combustion intimately among the tubes from the grate to the rear of the boiler, thence forward to the front, from which point the gases are returned rearward again through the flue 23, and escape through the smoke-connection 24, the latter being provided with the valve 25.

As indicated by the dotted line 26, the water level in the boiler is carried above the tubes, partially covering the inner shell of the steam-chamber 15, the latter being adapted to receive and hold the generated steam in sufficient quantity to insure an effective superheating and drying action thereon by the passage of the gases through the contiguous flue 23.

By the vertical arrangement of the side water-walls with respect to the fire-box 10,

convenience is afforded in handling the fire upon the grate and carrying a uniform bed of fuel thereon.

It has been found in practice that in the normal operation of the boiler as thus constructed, substantially no sediment or scale is to be found in the heating tubes after long use, all such impurities being collected in the mud-drum or settling-chamber, from which it is occasionally discharged without interrupting the action of the boiler by means of the blow-off connection 8, a complete stoppage being required only at rare intervals for the purpose of inspection or repairs.

What I claim as my invention and desire to secure by Letters Patent, is:

1. In a water-tube boiler, the combination of an inner and an outer shell spaced apart and connected together at their opposite ends and constituting therebetween a water and steam compartment, said shells being convexed at their top and bottom portions and forming an upper steam-chamber and a lower settling-chamber, the sides of said shells being upwardly and inwardly inclined and forming oppositely-disposed side water-walls communicating with said upper and lower chambers, a series of inwardly-extending tubes secured to the inner shell of said side water-walls and communicating therewith and having their inner ends closed, front and rear frames secured to said shells and inclosing said tubes, fuel-burning means disposed between said side water-walls and above said lower settling-chamber, baffle-plates carried by said tubes and forming gas-passages leading adjacent said upper steam-chamber, and a smoke-connection leading from said passage.

2. In a water-tube boiler, the combination of an inner and an outer shell spaced apart and connected together at their opposite ends and constituting therebetween a water and steam compartment, said shells being convexed at their top and bottom portions and forming an upper steam-chamber and a lower settling-chamber, the sides of said shells being upwardly and inwardly inclined and forming oppositely-disposed side water-walls communicating with said upper and lower chambers, a series of inwardly-extending and downwardly-inclining tubes secured to the inner shell of said side water-walls and communicating therewith and having their inner ends closed, front and rear frames secured to said shells and inclosing said tubes, fuel-burning means disposed between said side water-walls and above said lower settling-chamber, baffle-plates carried by said tubes and forming a series of gas-passages therebetween, the upper of said gas-passages leading adjacent said upper steam-chamber, and a smoke-connection leading from the upper gas-passage.

3. In a water-tube boiler, the combination of an inner and an outer shell spaced apart and connected together and constituting therebetween opposite vertical side water-walls, a lower settling-chamber and an upper steam-chamber, the inner wall of said steam-chamber being convex and affording draining means therefor, a series of inwardly-extending tubes secured to and communicating with said side water-walls and having their inner ends closed, fuel-burning means, and gas-passages leading between said tubes and having a wall thereof formed by the inner wall of said steam-chamber.

4. In a water tube boiler, the combination of an inner and an outer shell spaced apart and connected together and constituting therebetween opposite side water walls, a lower settling-chamber and an upper steam-chamber, a series of inwardly-extending tubes secured to and communicating with said side walls and having their inner ends closed, a fire-box located at the front of said boiler, upper and lower baffle-plates carried by said tubes and forming a plurality of horizontal gas-passages for directing the heat of said fire-box to the rear of the boiler, thence forward to the front and then again to the rear, the latter of said passages being formed by the upper baffle-plate and the inner wall of said steam-chamber, and a smoke connection leading from said upper gas passage.

Signed at Nutley in the county of Essex and State of New Jersey this 14th day of April A. D. 1913.

GEORGE KINGSLEY.

Witnesses:
W. J. KINGSLEY,
A. M. BODGE.