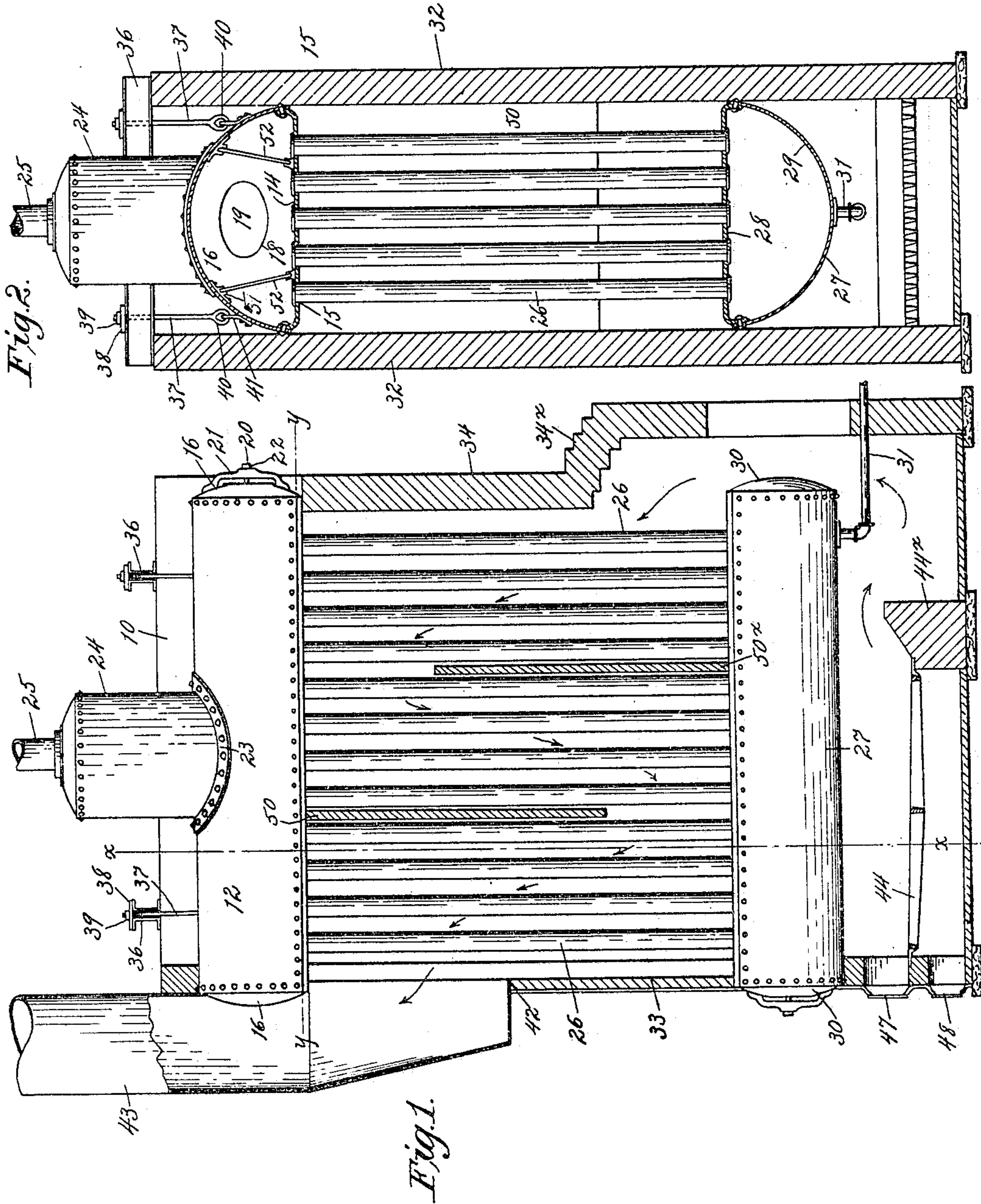


No. 801,696.

PATENTED OCT. 10, 1905.

W. T. URIE.
WATER TUBE BOILER.
APPLICATION FILED JAN. 10, 1905.



WITNESSES:
Robert A. Pollock.
S. L. C. Haason

INVENTOR.
William T. Urie
BY
Richard Manning
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM T. URIE, OF KANSAS CITY, MISSOURI.

WATER-TUBE BOILER.

No. 801,696.

Specification of Letters Patent.

Patented Oct. 10, 1905.

Application filed January 10, 1905. Serial No. 240,458.

To all whom it may concern:

Be it known that I, WILLIAM T. URIE, a citizen of the United States of America, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Water-Tube Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The objects of the invention are, first, to increase the area of the tube-surfaces of the headers without lessening the resistance to the high pressure of the steam; second, to increase the water circulation, and, third, to economize the heat to the production of steam.

The invention consists in the novel construction and combination of parts, such as will be first fully described and then specifically pointed out in the claims.

In the drawings, Figure 1 is a side view in elevation of the improved water-tube boiler, shown suspended in position, furnace-walls being shown in longitudinal section. Fig. 2 is a vertical sectional view of the boiler, taken on the line *x x* of Fig. 1.

Similar numerals of reference indicate corresponding parts in both the figures of the drawings.

Referring to the drawings, 10 represents the header of the improved boiler, which consists of the longitudinally-extended crown sheet or plate 12, which is semicircular in cross-section. Between the longitudinal sides of the crown-plate 12 is the horizontally-extended tube-sheet or base-plate 14, the longitudinal sides of which plate are bent or curved upwardly and riveted to the inner surface of the crown-plate. In the plate 14 are a series of openings 15 for the water-tubes. The ends 16 of the header consist of semicircular plates, from which extend the flanged portion 17, which extends within the inner surface of the crown-sheet 12 and the tube-plate and is riveted thereto. In the rear end 16 of the header is an elliptical-shaped opening or manhole 18 of suitable size to admit the passage of the body of the person when access is desired to the header. This manhole is provided with an inner closing door-plate 19, upon which is a projecting screw-threaded rod 20, which extends through the removable yoke 21 on the outer side of the end 16 of the header. Upon the rod 20 is a nut 22, which secures the man-

head or door in position and bears upon the yoke 21. Upon the upper surface of the crown-plate 12 is an opening 23, and connected with the crown-plate is a superheating cylinder or dome 24, the flanged lower end of which cylinder extends around the opening 23 in the crown-sheet. Connected with the upper end of the dome 24 is the steam-supply pipe 25, which is shown broken away. With the openings 15 in the tube-plate 14 are connected the upper ends of the series of water-tubes 26, of considerable length, the inner ends of which are beaded upon the inner surface of the plates.

With the lower ends of the water-tubes is connected the end receptacle or drum 27, which is constructed with a flat longitudinally-extended tube-plate 28 at the top, which is the same as the plate 14, and the curved under plate 29, which is semicircular in cross-section. The ends 30 of the mud-receptacle are flanged and riveted to the top or tube plate 28 and the bottom or plate 29 in like manner to that of the ends 16 of the header. With the bottom of the mud-receptacle 29 is connected the valved blow-off pipe 31. In the forward end of the mud-receptacle is a manhole, closed by a door in the same manner as is the header 10.

32 represents the vertically-extended furnace side walls, and 33 indicates the front end wall and 34 the rear end wall.

The superheating dome 24 extends above the line of the upper ends of the furnace-walls.

The improved boiler is suspended within the furnace so as to permit of expansion and contraction without injury to the furnace-walls, and for this purpose I-beams 36 are arranged in a transverse direction to and upon the top 35 of the furnace in pairs. Through the beams extend the adjustable supporting-rods 37, which are provided with screw-threaded upper ends, upon which are the washers 38 and nuts 39. The lower ends of the rods extend through the top of the furnace and are provided with hooks 40, which engage with the ears or loops 41 on the crown-sheet 12 of the header.

Within the front furnace-wall 33, directly below the line of the under surface of the header 10, is a flue-opening 42 for the escape of the smoke and gases unconsumed in the furnace. Connected with the outer surface of the wall is a smoke-conducting pipe or stack 43, the lower end of which extends around the opening 42, and the other end ex-

tends in an upward direction above the level of the top of the furnace. Beneath the mud-receptacle or drum 27 and supported at their forward ends in the furnace-wall 33 are the grate-bars 44, the inner ends of which bars are supported by the bridge-wall 44^x. The space beneath the mud-receptacle and above the grate-bars constitutes the fire or combustion chamber, this chamber being extended beyond the rear end of the mud-receptacle, and for this purpose in the rear end wall 34 at a point about one-half the distance downwardly from the upper end of the wall is an offset 34^x in the wall, extending outwardly at an angle, and thence downwardly to the ground. The front wall 33 is provided with the usual furnace-doors 47 and 48, the former closing the entrance to the fire-chamber and the latter to the ash-pit.

Extending transversely to the furnace from the inner surface of one wall 32 to the inner surface of the other wall at points equidistant from each other and the ends of the furnace-wall are baffle walls or plates 50 and 50^x, which also extend between the series of tubes in the boiler adjacent thereto, the baffle-wall 50, which is located in the direction of the front wall 33, extending downwardly from the line of the under surface of the header 10 a little over one-half the distance in the direction of the mud-receptacle 27, and the baffle-wall 50^x extends upwardly from the line of the upper surface of the mud-receptacle a little over one-half the distance in the direction of the header 10.

The fuel upon the grate 44 in the fire-chamber being ignited, the flame is directed upon the under surface of the mud-receptacle 27, and the products of combustion pass to the rear end of the receptacle into the extension of the chamber in the wall 34, thence upwardly and deflected by the offset 34^x inwardly around the outer surfaces of the series of pipes 26, thence over the upper end of the baffle-plate 50^x, thence following the sinuous passage downwardly beneath the lower end of the baffle-plate 50, thence to the flue-opening 42, and out of the flue or stack 43. The heat, which is intensified by the air-drafts, heats the furnace-walls to an incandescence, and the gases, which ordinarily escape, are in the furnace largely consumed, and thus enabling the rapid generation of steam under the intense heat with the greatest economy in fuel.

The direct application of the heat of the furnace from the combustion of the fuel upon the grate-bars to the mud-receptacle affords equal expansion of all the parts of the boiler, and the circulation of the water is produced throughout the boiler in an efficient manner, making the generation of steam in a short period of time and also maintaining a high pressure of the steam. In the consumption of the furnace-gases, which occurs in the en-

tire length of the passage through the furnace to the exit-openings, the heat is imparted to the water-tubes, and the generation of steam is at its maximum degree. It is obvious that in the former use of water-tube boilers the flame has been directed upon the water-tubes, and the generation of the steam under such circumstances was due to the heat imparted to the tubes, while the degree of temperature of the mud-receptacle was unequal. The flame also acted to burn the water-tube and impair the value of the tubes.

In order to resist the expansive force of the steam, crow-foot braces are arranged within the header 10. These braces consist of lugs or angle-plates 51, which are connected with the upper surface of the tube-plate 14 and with the top portion of the crown-plate 12. Removable bars 52 are connected at their ends with the angle-bars by means of suitable bolts, which pass through the ends of the bars and also the angle-plates, the bolts having openings at the ends for a suitable key.

The construction of the headers and mud-receptacle enables the multiplicity of water-tubes, so that the enlargement of the boiler capacity is within the reach of the invention. The invention also eliminates the necessity for hand-hole plugs, the water-tubes being at all times ready to be drained and to which access is had by removing the door 19 in the end of the header, thereby enabling a person to enter the header and clean and repair the tubes.

The invention enables the rapid settlement of impurities in the water in the header within the mud-receptacle which find their way by gravitation thereto.

Such modifications of the invention may be employed as are within the scope of the invention.

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

1. In a water-tube-boiler furnace the combination with a top header of a lower water-receptacle arranged above the furnace-grate, said header and lower receptacle being each formed with flat tube-plates, water-tubes connecting the flat tube-plate in the header with the flat tube-plate in the lower water-receptacle, transverse supporting-beams on the furnace-walls and adjustable supporting-rods connected with the top header and said beams.

2. In a water-tube-boiler furnace the combination with the side walls of a rear end wall having an offset and a front end wall having a flue-opening and a water-tube boiler suspended within said furnace-walls above the furnace-grate said offset forming a combustion-chamber for the fuel and deflecting the flame in the direction of said water-tubes.

3. In a water-tube boiler the combination with an upper header of a lower water-receptacle arranged above the furnace-grate said

header and lower water-receptacle being composed of semicircular crown and fire plates respectively with flat tube-plates and end plates to said header and water-receptacle said end
5 plates having manholes and doors thereto a series of water-tubes connecting the flat tube-plate of the header with the flat tube-plate of the lower receptacle, a steam-dome mounted on the header, sinuous passages for the smoke
10 and gases formed between said series of wa-

ter-tubes with means for retaining the boiler in a suspended position and means for causing a reverberate action of the products of combustion on the furnace-grate toward said sinuous passages.

WILLIAM T. URIE.

Witnesses:

ANNIE L. GREER,
J. Y. BEARD.