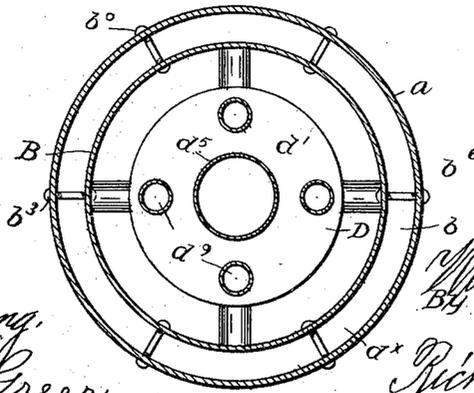
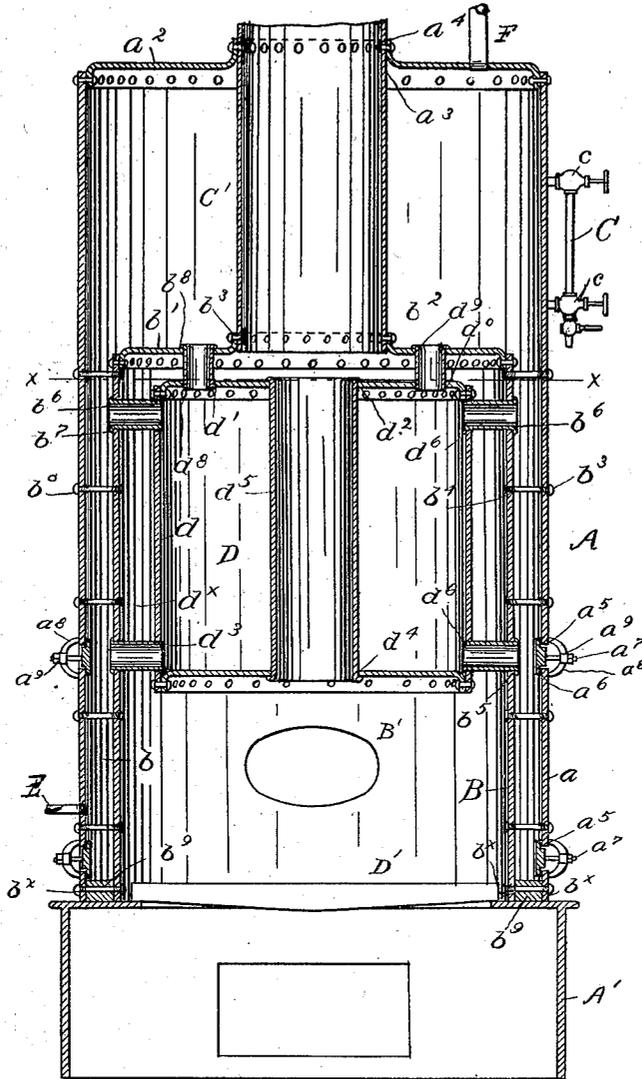


W. T. URIE.
STEAM BOILER.

(Application filed Nov. 28, 1900.)

(No Model.)

Fig. 1.



Witnesses

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Fig. 2.

UNITED STATES PATENT OFFICE.

WILLIAM T. URIE, OF KANSAS CITY, MISSOURI.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 681,280, dated August 27, 1901.

Application filed November 28, 1900. Serial No. 38,034. (No model.)

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 Steam-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 my invention are, first, to economize the fuel employed in a boiler to generate steam; second, to prevent the ebullition of the steam from collapsing the steam-generating drum, and, third, to obviate the rapid contraction and expansion of the drum and the consequent warping of the flue.

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

In the drawings, Figure 1 is a vertical sectional view of an upright boiler embodying the invention. Fig. 2 is a horizontal sectional view taken upon the line xx on Fig. 1.

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

Referring to the drawings, A represents the improved vertical steam-boiler, and A' the base. The boiler A consists of an outer cylindrical casing or shell of the ordinary height, in the upper end of which is fitted a circular plate or head a^2 and the outer edges of which plate are bent inwardly and riveted to the shell a . In the head a^2 at a point equidistant from the sides of shell a is a circular opening a^3 of considerable size, the sides of which are bent outwardly to form an annular flange a^4 .

Within the case or shell a is a concentric shell B, smaller in size than the shell a and which extends from a position in a horizontal line with the lower end of the shell a upwardly about two-thirds the height of shell a , and between said outer and inner shells is an annular space b for water. In the upper end of the inner concentric shell B is a circular plate or head b' , the outer edges of which plate are bent inwardly and bolted to

the inner side of the shell B in the same manner as the head a^2 is bolted to the shell a . In the head or plate b' in a vertical line with the side of the opening a^3 in the head a^2 of case a is an opening b^2 of the same size as the opening a^3 and having the sides of said opening bent upwardly to form an annular flange b^3 . Within the opening b^2 in head b is inserted one end of a smoke-flue C, which is bolted to said flange b^3 and also to the flange a^4 on the head a^2 of shell a and extends the requisite distance from the outer side of said head to obtain an air-draft.

In the annular space b between the outer and inner shells a and B, at the lower ends of said shells, is a ring b^0 of suitable thickness, which retains the water in said space and is held in place by the screw-bolts b^x , which pass through the plates a and B into said ring. The inner shell B is also stiffened and prevented from warping by the bolts b^0 , which pass horizontally through the shell a and whose inner ends are screw-threaded and inserted within the screw-threaded openings b^4 , made in the shell B at suitable distances apart from each other in the circumference of the shell.

Within the shell B and coextensive with the combustion-chamber B' and occupying a position in the upper part of said shell and the said chamber is a water-circulating steam-generating receiver or drum D, the sides d of which are concentric with the inner sides of shell B, and between said sides and the side d of drum D is an annular space or passage d^x for the smoke and gases, the width of said passage being slightly greater than the width of the space between the shells a and B. In the upper end of drum D is a circular plate or head d' , the outer edge of which is bent at right angles and inwardly and bolted to the sides of the said drum. In the head d' at a point intermediate the sides d is a circular opening d^2 , smaller in size than the opening b^2 in the head b' of shell B. d^3 is the bottom of the drum, which is the same as the top d' , the bent portion of the outer edge being extended downwardly and bolted to the inner side of the side d of said drum. In the bottom d^3 in a vertical line with the opening d^2 in head d' is a circular opening d^4 of the same size as the opening d^2 . Extending through the

drum D and the openings d^2 d^4 is a smoke-flue d^5 , the ends of which are bent over upon the outer surfaces of the respective upper and lower heads d' d^3 of said drum. Between the top d' of drum D and the inner side of the head b' of case B is a space or passage d^0 for the smoke and gases, the width of which is the same as the space d^x between the side d of drum D and the shell B and communicates with the passage d^x . In the sides d of the drum D at suitable distance apart in the line of its circumference and near the top and bottom of said drum are screw-threaded openings d^6 , and in the shell B directly opposite the openings d^6 are openings b^5 slightly larger in size than openings d^6 . Within the openings b^5 are inserted the tubes or nipples b^6 , which are externally screw-threaded and also extend to the drum D, and within the opening d^6 in said drum the ends of the tubes in openings b^5 of shell B, which extend a short distance beyond the plane of the outer side of said shell, being upset outwardly, as at b^7 , so as to exclude water from the openings b^5 . In the top or head d' of drum D are openings d^8 at suitable distances apart from each other and upon a line concentric with the openings d^2 for tube d^5 , said openings being approximate to the side d of said drum. In the top or head b' of shell B in a vertical line with the openings d^8 are openings b^8 , slightly larger in size than the openings d^8 . In the openings b^8 are extended the vent-tubes d^9 , the lower ends of which are externally screw-threaded and extend within the openings d^8 of the head d' of drum D, and the edges of the said tubes at their upper ends, which extend a short distance above the plane of the outer side of the top b' , are upset or bent outwardly upon the said top, said tubes also serving to sustain the weight of drum D with the additional weight of water. In the shell a opposite the openings b^5 in shell B are openings a^5 for obtaining access to and removing scale, &c., from tubes b^6 and drum D, which openings are covered on the inner side of case a by the valves a^6 . Upon each valve a^6 is a screw-threaded stem a^7 , and upon the outer side of case a , extending over said openings a^5 , is the stationary curved plate a^8 , which is perforated to receive the stem a^7 , and upon the stem a^7 is a nut, which bears upon the outer side of the plate a^8 . Upon the outer side of case a and near the upper end are water-gage cocks c c and gage C' of the ordinary description. The lower end of the steam-boiler A is mounted upon an annular flange b^9 upon the upper edge of the base or support A' , which extends inwardly and also supports the grate-bars D' , the base constituting the ash-box and the space above the grate forming the combustion-chamber.

E is the water-supply pipe, which is connected with the case a a short distance above the lower end of said case and extends within the space b between the shell or case a

and the shell B. In the admission of water to the annular space b under pressure from the street service or other source of supply through pipe E the water as it rises in height in said space enters the drum D through the tubes d^6 and fills said drum and expels the air and also rises above the top b' of shell B and to a considerable distance above said top, the water extending around the smoke-flue C, as indicated in the drawings. The products of combustion from the fuel upon grate-bars D pass upwardly through the flue d^5 and also within the passage d^x on the outside of drum D and in the passage d^0 over the top d' of said drum, thence up the smoke-flue C, which being larger in circumference than flue d^5 increases the draft. The live steam being quickly generated in the drum D, owing to the large amount of heating-surface, causes ebullition of the water near the head d' and the steam passes up the tubes d^9 , relieving the steam-pressure upon the head and sides of the drum and raising the degree of temperature of the water between the case a and the shell B, the inflammable gases which are diverted from the passage d^x to the passage d^0 being utilized to increase the production of steam with less waste in ordinary steam-boilers. The heat which is directed upon the lower tubes b^6 also passes around the upper tubes and increases the water circulation from the cold areas toward the drum D. In my improved boiler the generation of steam is accomplished within a short space of time and with the consumption of a minimum amount of fuel. The lower ends of the shells being connected by the ring b^9 admit of the convenient removal for repairs of the internal shell B by the removal of the bolts securing said shells to the ring and the flue C from the shell or case a .

I am aware that steam-generating drums have been employed within the combustion-chamber of a steam-boiler, around which chamber the water circulates, and that the drum is connected with water-supply tubes extending through the combustion-chamber. I am also aware that the steam-generating drum has been provided with smoke-flues; but I am not aware that the forced draft through the smoke-flue of the drum is in any heretofore invention effective to cause the heated smoke and gases to circulate entirely around the drum and not only prevent undue expansion of the drum in any one direction, but also to utilize more of the heat units in generating steam.

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

The combination in a steam-generating vertical boiler with the outer shell and the head thereof of an inner concentric shell having a head and a combustion-chamber therein and an annular space between said outer and inner shells for the water and a chamber for water between the heads of said shells

communicating with the space between said shells, a ring closing the said annular space at the lower ends of said outer and inner shells, a smoke-flue connected with the head of the inner shell and extending through the head of the outer shell a drum for holding water within the combustion-chamber of the inner shell around which drum the smoke and gases circulate water-supply tubes connected with the inner shell and the sides of said drum separate water-tubes connected with the head of said inner shell and the top of said drum, and a smoke-flue extending through said drum in the direction of and in a vertical line with the smoke-flue in the head of said inner shell substantially as described.

WILLIAM T. URIE.

Witnesses:

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E. L. MARLIN.