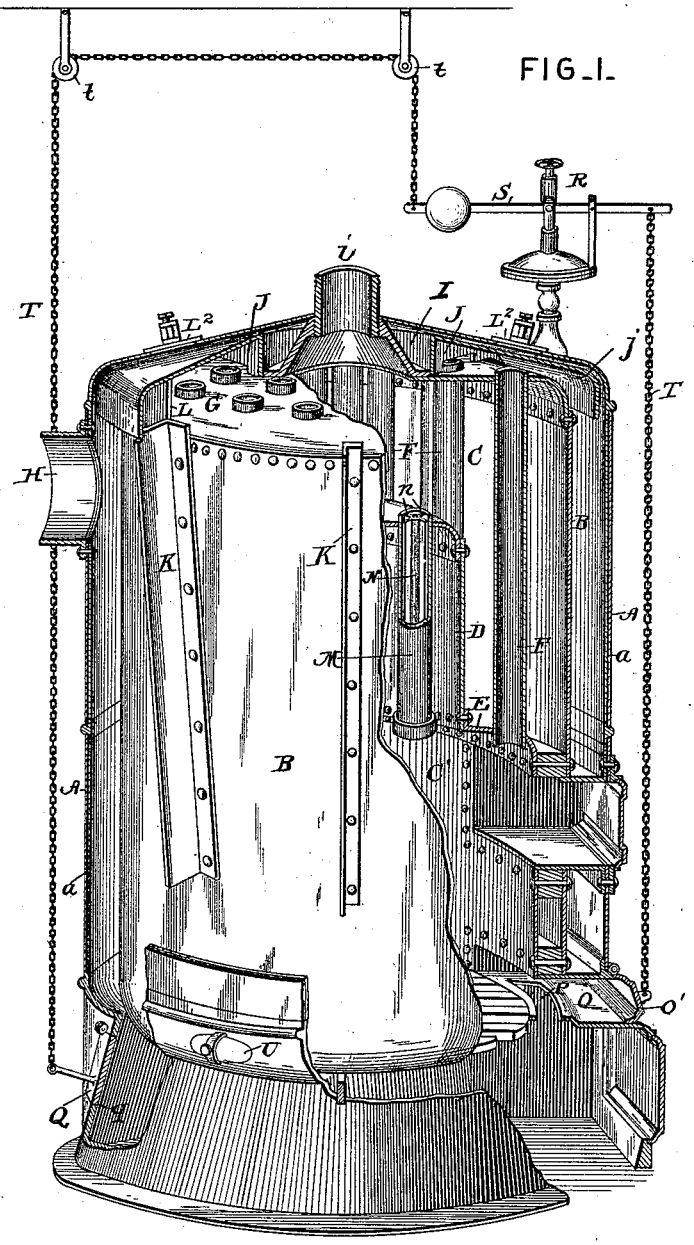
(No Model.) 3 Sheets—Sheet 1.

H. H. LINDEMUTH.

VERTICAL BOILER.

No. 490,669. Patented Jan. 31, 1893.

FIG. 1.



Witnesses

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(No Model.) 3 Sheets—Sheet 2.

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FIG_2

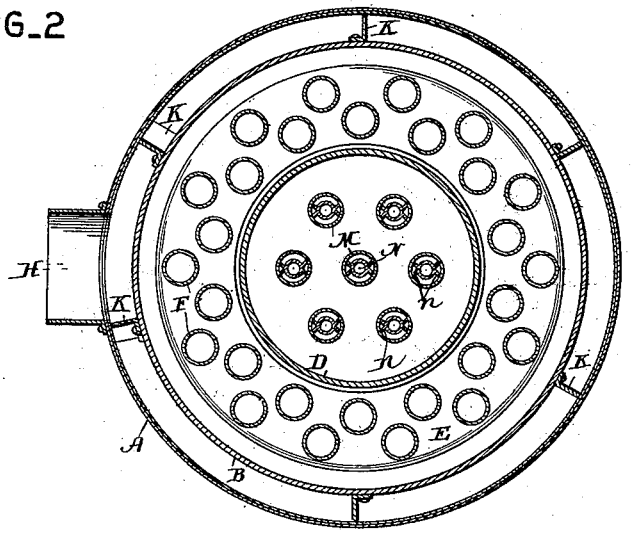
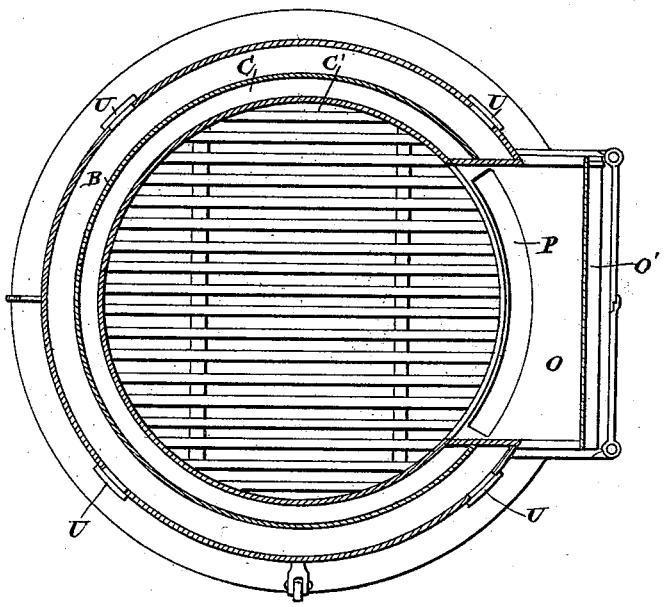


FIG_3_



Witnesses

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(No Model.) 3 Sheets—Sheet 3.

H. H. LINDEMUTH.

VERTICAL BOILER.

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FIG. 4.

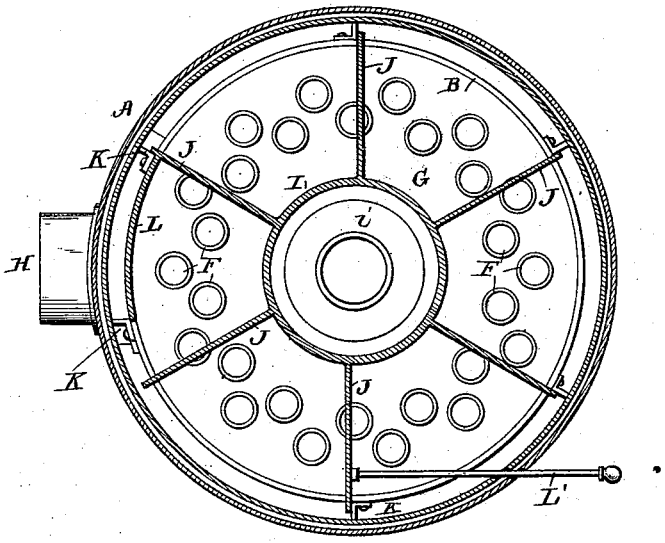


FIG. 5.

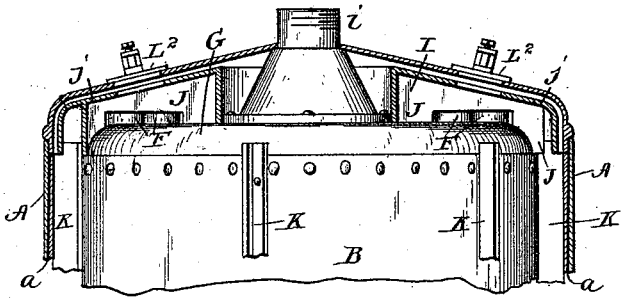
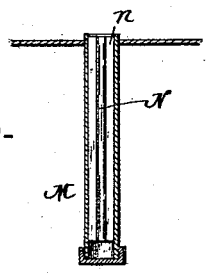


FIG. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

HARRY H. LINDEMUTH, OF HARRISBURG, PENNSYLVANIA.

VERTICAL BOILER.

SPECIFICATION forming part of Letters Patent No. 490,669, dated January 31, 1893.

Application filed April 25, 1892. Serial No. 430,533. (No model.)

To all whom it may concern:

Be it known that I, HARRY H. LINDEMUTH, a citizen of the United States, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented a new and useful Vertical Boiler, of which the following is a specification.

This invention relates to steam generators or boilers; and it has for its object to provide certain improvements in such types of boilers as that for which I obtained Letters Patent No. 398,267, February 19, 1889.

To this end the improvements comtemplated by this invention are designed to provide a boiler which shall be so constructed as to provide for a more rapid generation of steam, and therefore a more thorough distribution of the smoke and other products of combustion, together with an increased water area.

With these and many other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a perspective sectional view of a steam boiler constructed in accordance with this invention. Fig. 2 is a central horizontal sectional view of the same. Fig. 3 is a similar view at the grate line. Fig. 4 is a similar view directly under the crown sheet. Fig. 5 is a detail vertical sectional view of the upper part of the boiler. Fig. 6 is a similar view of one of the drop water tubes.

Referring to the accompanying drawings;—A represents the outer inclosing casing of a boiler, which is preferably constructed of one or more sheets having suitable asbestus packing *a*, interposed therebetween, in order to give greater strength and durability thereto. The inner shell or casing B is located within the outer casing in from the sides and crown sheet thereof to form a heat jacket, between the two casings, so that the heat is distributed the entire height of the boiler, and presents a larger heating surface for the water space C, inclosed within the inner casing B directly over the fire box C′ and around said fire box. Directly over the fire box C′ is located the upwardly extending heat chamber D, projecting above the lower tube sheet E, which receives the lower ends of the flues F, opening into the fire box at the base of said heat chamber, and passing through the water space between said chamber and the inner casing B, and opening into the dome G, between the crown sheets of the inner and outer casing respectively. The smoke and other products of combustion which circulate into the heat chamber D, and through the flues F, pass into said dome G and are directed from thence down between the outer and inner casing inclosing the heat jacket, and finally escape through the pipe H located in one side of and near the top of the boiler.

Working over the crown sheet of the inner casing B is the draft or heat regulating spider I. The said spider I encircles the steam pipe *i*, opening into the water space, and is provided with a series of radially extending plates or arms J which work snugly over the top of the crown sheet of the inner casing and the projecting flues F, and are capped by the cover *j*, corresponding to the curvature and shape of the crown sheet of the outer casing and working slightly below the same. The extreme outer ends of the radially extending arms or plates J are designed to be thrown into alignment with the vertical division heat guiding plates K, secured within the heat jacket and extending from the top of the crown sheet of the inner casing to a point near the bottom of the same. Now it can be readily seen, that as the smoke and other products of combustion pass out of the upper ends of the flues F, and strike the cover of the spider, the spider arms or plates when in alignment with and resting against the several vertical division plates K, direct the heat into the heat jacket down which the same and the products of combustion must pass, between the said division plates, before they can find escape around the lower ends of the same and into the space between the two division plates on each side of the escape pipe H, into which space all the heat &c., passes, and thence through the escape. This draft of the heat, smoke, and other products of combustion is caused, when the spider I is turned so that the door or gate L, closes the escape from between the spider arms into the space between the two division plates K on each side

of the escape pipe. The said door or gate L is of course on an arc of a circle, and is secured to one of the spider arms or plates and near the end thereof and terminates short of the next adjacent spider arm, so that when closing the opening from between the spider arms into the aforesaid space between the plates on each side of the escape, a sufficient space is left for the smoke &c., to pass into the next adjacent space. When the spider is turned so that the arc door or gate carried thereby, uncovers the space directly opposite the smoke escape, the draft is more direct, and the smoke, &c., can find escape directly through the pipe H without coursing down and through the heat jacket between the outer and inner casing. A suitable operating rod L′ extends through the boiler and is connected with said spider, so that the same may be readily turned to regulate the draft. Suitably closed cleaning holes L^2 are located in the top of the boiler of said spider in order to gain access to the flues F for the purpose of cleaning the same.

Opening into the water space C through the crown sheet of the heat chamber D and depending within said chamber the full height of the same directly over the fire box, is a series of drop tubes M closed at their lower ends so as to provide for circulation therein. A constant and uninterrupted circulation of water through said drop tubes is maintained by means of the smaller concentric circulating tubes N, located within said drop tubes and terminating short of the bottom ends thereof. The said circulating pipes are provided with a series of radially extending wings, *n*, extending close to the sides of the drop tubes and forming a series of separate and independent passages between the drop tubes and the concentric circulating tubes within the same said wings fitting sufficiently tight within the drop tubes to hold the circulating tubes in position therein. It will be readily seen that the heat from the fire box directly under said tubes will cause the water to circulate from the water space around the fire box through the circulating tubes to the bottom of the drop tubes, and thence up through the circulating passages on each side of the circulating tubes, whereby the circulating water is brought more constantly in contact with the heat, and thus provides, in combination with the heat jacket encircling the entire water space, for a rapid and easy generation of steam.

The boiler is provided in a line with the grate therein, with the draft passage O, in the bottom of which is located an opening P which provides for the removal of clinkers &c., from the grate, and is closed at its outer end by the automatically regulated draft door O′, which is designed to work in conjunction with the oppositely located draft door Q, closing a draft opening *q*, in the back of the ash pit. The said boiler is provided with an ordinary pressure regulator R, having an ordinary operating lever S, to opposite ends of which are connected the opposite operating chains T one of which is connected to the door O′. The opposite chain T connected to the opposite end of the lever passes over suitably arranged pulleys *t*, and is connected to the draft door Q so that when the pressure in the boiler lessens, the lever draws the operating chains T, in such a manner that both the doors O′ and Q are simultaneously opened, to insure the requisite draft to brighten up the fire to raise the pressure in the boiler, which when at a sufficient pressure causes the said doors to be closed or partially closed to lessen the draft.

The said boiler is provided with suitably arranged inclosed cleaning holes U located in the outer casing in order that ready access may be had to the interior of the heat jacket for cleaning &c.

It is now thought that the construction and many advantages of the herein described improvements are apparent without further description.

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

1. In a boiler, the combination of an inner and outer casing forming an annular heat jacket and heat dome between the crown sheets of said casings; of an interior water space inclosed within said inner casing, smoke flues passing through said water space from the fire box to said dome, and a movable heat regulating spider within said dome and occupying the entire space therein, substantially as set forth.

2. In a boiler, the combination of an inner and outer casing forming an annular heat jacket and heat dome between the crown sheets, an interior water space, smoke flues passing into said dome from the fire box, heat guiding plates arranged within said heat jacket, and a covered and radially armed oscillating heat regulating spider mounted within said dome and adapted to align with said plates, substantially as set forth.

3. In a boiler, the combination with an annular heat jacket and heat dome communicating with said jacket, a circumferential series of vertically arranged division or heat guiding plates within said jacket, and a covered or capped oscillating heat regulating spider mounted within said dome, to occupy the entire space therein and adapted to align with the upper ends of said vertical plates, substantially as set forth.

4. In a boiler, the combination with an annular heat jacket terminating in a heat dome, and smoke flues opening into said dome, of vertically arranged division heat guiding plates arranged within said jacket from said dome to a point short of the bottom of said jacket, and an oscillating heat regulating spider, having a series of radially extending arms or plates adapted to be aligned with the upper ends of said division plates, and a cover

inclosing the top of said radially extending arms or plates, substantially as set forth.

5. In a boiler, the combination with an annular heat jacket terminating in a heat dome, smoke flues opening into said dome and an escape pipe leading from the jacket near its upper end; of vertically arranged division heat guiding plates located within said jacket, an oscillating heat regulating spider having a series of radially extending arms or plates adapted to be aligned with the upper ends of said division plates, a cover inclosing the top of said radially extending arms, and an arc door or gate projecting from one of the spider arms near its end and adapted to open and close the space between the upper ends of the division plates on each side of the escape pipe, and means for operating said spider, substantially as set forth.

6. In a boiler, the combination with an annular heat jacket, an inclosed water space, and a heat chamber projecting into the water space above the fire box, of a series of drop water tubes opening into the water space through the crown sheet of said heat chamber and depending within said chamber, and concentric circulating pipes arranged within said drop tubes, terminating short of the bottom ends thereof, and provided with a series of radially extending wings meeting the sides of the drop tubes and forming a series of circulating passages, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY H. LINDEMUTH.

Witnesses:
J. A. DUNKLE,
C. S. BIGLER.