

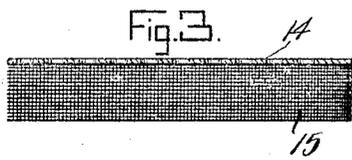
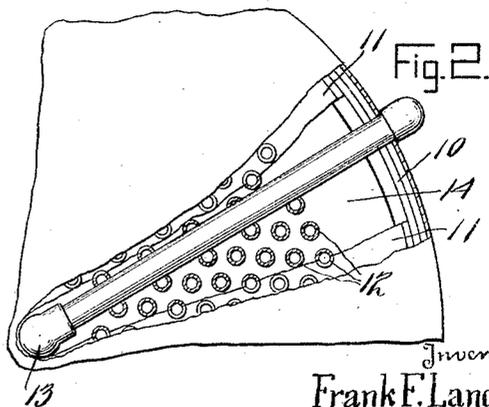
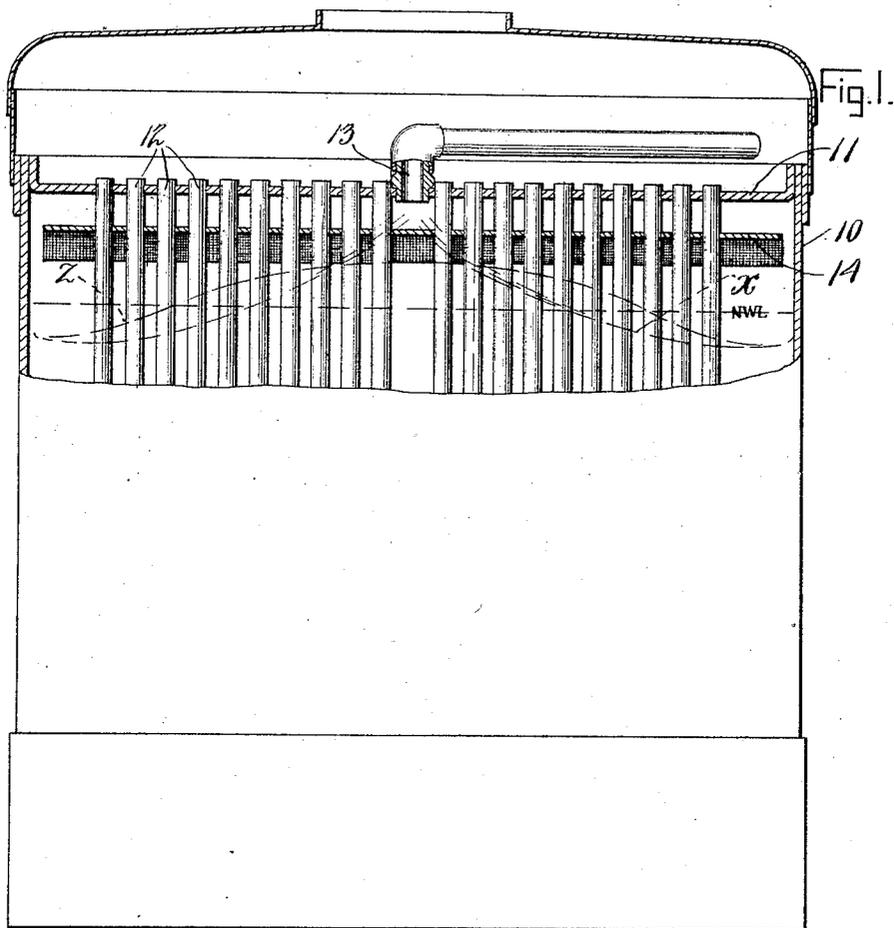
July 21, 1925.

1,546,665

F. F. LANDIS

STEAM BOILER

Filed June 18, 1921



Inventor
Frank F. Landis

By *W. B. Bradford*
Attorney

UNITED STATES PATENT OFFICE.

FRANK F. LANDIS, OF WAYNESBORO, PENNSYLVANIA.

STEAM BOILER.

Application filed June 18, 1921. Serial No. 478,563.

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States, residing at Waynesboro, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Steam Boilers, of which the following is a specification.

This invention relates to steam boilers and more particularly to that type of steam boiler known as the vertical fire tube type.

It is frequently desirable to employ comparatively small boilers of this type under conditions requiring the supplying of steam suddenly and in extremely varied quantities. These boilers are about one-fourth the size of the ordinary boilers and it is to this small type of boiler that this invention particularly relates. Such small boilers are most commonly employed for furnishing steam to propel automobiles, trucks, farm tractors and in such other places where the available space necessitates the use of a small and light boiler. It is well known that steam boilers will discharge "wet" steam when working at high heat and with extreme fluctuations in the demand for steam, such as will occur in the use of steam automobiles and like machines. Such "wet" steam is due to violent agitation of the water, causing imperfect separation of steam from the water, and is generated, for example, when the steam discharge is suddenly increased to a point above the producing capacity of the boiler. The agitation is greatest at the center of the boiler, where the water is hottest and least at the sides, where the water is least heated, and this increases the tendency to discharge "wet" steam, as the outlet for steam is generally over the center of the boiler, where the steam is oftenest wet and to the greatest degree. The discharge of wet steam causes a great waste of fuel and therefore the steam space especially in vertical fire tube boilers in commonly made at least equal to the water space. This requires either that the boiler be made needlessly large, or that the water space and the water in the boiler be reduced to a low limit. In stationary engines, especially of the larger types, needless size and weight are not a serious matter, but they are highly undesirable in small engines especially of the portable types used to drive vehicles, etc., not only because of the additional weight and size but even more because of the space taken up

where space is already very limited. On the other hand if the water space and the quantity of water in the boiler are reduced, the area of water in contact with the heating surface is cut down, as also the quantity of water at abnormally high temperature due to steam pressure, and thus the reserve power of the boiler which lessens the fluctuations in steam pressure on account of varying demand for steam or varying fuel consumption is also reduced.

The object of this invention is to provide a boiler of the type referred to which shall be efficient and economical when employed for extremely high duty, and yet be extremely small and compact.

Another object of my invention is to provide a steam boiler having an outlet approximately central of the crown sheet and a baffle positioned beneath the crown sheet in such a manner that the steam generated below the baffle must all move for some distance among and against the heated fire tubes before reaching the outlet.

A further object is to provide means for drying the steam in proportion to its possible wetness, that generated at the point of greatest ebullition having the longest travel and impinging most frequently against the heated fire tubes, and vice versa, thereby drying all the steam equally and thoroughly. The wettest steam also takes the most tortuous course, and its currents are most frequently broken up, all of which factors contribute to the desired end.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a view of the boiler, partly in side elevation and partly in diametrical section, showing the present invention applied thereto,

Figure 2 a top plan view of a fragment of the boiler, a part of the top being broken away to show the crown sheet in plan which is again broken away to show the baffle in plan with the tubes in section, and

Figure 3 a detail view showing a modified form of baffle plate which under some conditions is employed, and which has a screen about the periphery of the baffle.

Like characters indicate corresponding parts throughout the several views.

In the drawings, 10 indicates a vertical fire tube steam boiler of ordinary type ex-

cept that it is only from one-third to one-half the usual height, 11 the crown-sheet, 12 the fire tubes fitting tightly in the crown-sheet, 13 the steam outlet and 14 the baffle plate.

The dotted lines at z in Figure 1, indicate the conical shape which the upper surface of the water tends to assume in the usual boiler under conditions of high temperature and excessive steam discharge as above described. The water boils up at the center, flows toward the sides and down along them, inwardly at the bottom and so up again. The wettest steam has the best chance to escape, being nearest to the outlet, and the higher the normal water level the greater the discharge of wet steam and consequent waste of fuel.

When my baffle is used as shown the upper surface of the water will assume a less conical shape substantially as indicated by dotted line z in Figure 1, as the steam rising at the middle cannot pass directly toward the outlet, but must pass through the space between the outer edge of the baffle plate and the sides of the boiler. In its passage much of the wettest steam strikes the baffle plate and deposits a part of its moisture thereon.

Steam arising from the region at the middle of the boiler in its passage toward the edge of the baffle plate impinges directly against the portions of the tubes projecting above the water and the currents of steam act substantially at right angles to the tubes and are divided thereby again and again so as to take a tortuous course, whereby the steam is caused to lose any surplus moisture through its contact with the heated tubes, the wettest steam from the central point passing the most tubes and being most frequently turned aside around successive tubes. On passing the baffle plate the same process is repeated, all the steam now traveling around the fire-tubes between the baffle-plate and the crown sheet over substantially the same distance.

In a high boiler where the space between the crown sheet 11 and the normal water level (NWL) could be equal to or double the water space below the line, my device may be found to have no effect of any great value, and I intend it more particularly for those boilers which by reason of want of space must be low or short and should be

light in weight, and especially boilers of the type shown in the drawings. It is to be noted that the tubes fit the baffle 14 tightly and the only outlet from below the baffle to above the same is the narrow annular space around its edge. This is important in maintaining the low water line in the center as indicated by dotted line z .

In some situations it is desirable to use a screen or foraminous curtain, such as shown at 15 (Fig. 3) about the edge of the baffle plate, as where the quality of water used is unfavorable for steam.

Whether this last element be used or not, it should be noted that my device increases the distance traveled by all the steam wherever generated, increases the time it remains in the boiler and causes it, and especially the wetter parts, to impinge again and again on the hot fire-tubes, all of which are ideal factors for separating water from the steam while passing from the surface of the water to the outlet tube. It should also be noted that I utilize about 80% of the space in the boiler as water space, instead of 30 to 50%, whereby 80% of the surface of the fire tubes is in contact with the water.

Having thus fully described my said invention what I claim as new and desire to secure by Letters Patent, is:

1. A steam generator comprising a boiler having vertical fire tubes, a crown sheet, and an outlet conduit, a baffle comprising a disk embracing the fire tubes and spaced from the crown sheet forming an annular space between its periphery and the periphery of the boiler, and a foraminous curtain depending from the periphery of the baffle.

2. A steam generator comprising a boiler having vertical fire tubes, a crown sheet, and an outlet conduit, a baffle embracing the fire tubes and spaced from the crown sheet forming a space between its periphery and the periphery of the boiler, and a foraminous curtain depending from the periphery of the baffle.

In witness whereof, I have hereunto set my hand and seal at Waynesboro, Pennsylvania, this 9th day of June, A. D. nineteen hundred and twenty-one.

FRANK F. LANDIS. [L. s.]

Witnesses:

M. S. LANDIS,
IRVING G. HALL.