A. B. STIRLING.

BOILER CONSTRUCTION.

APPLICATION FILED MAY 20, 1910.

977,144.

Patented Nov. 29, 1910.

2 SHEETS—SHEET 1.

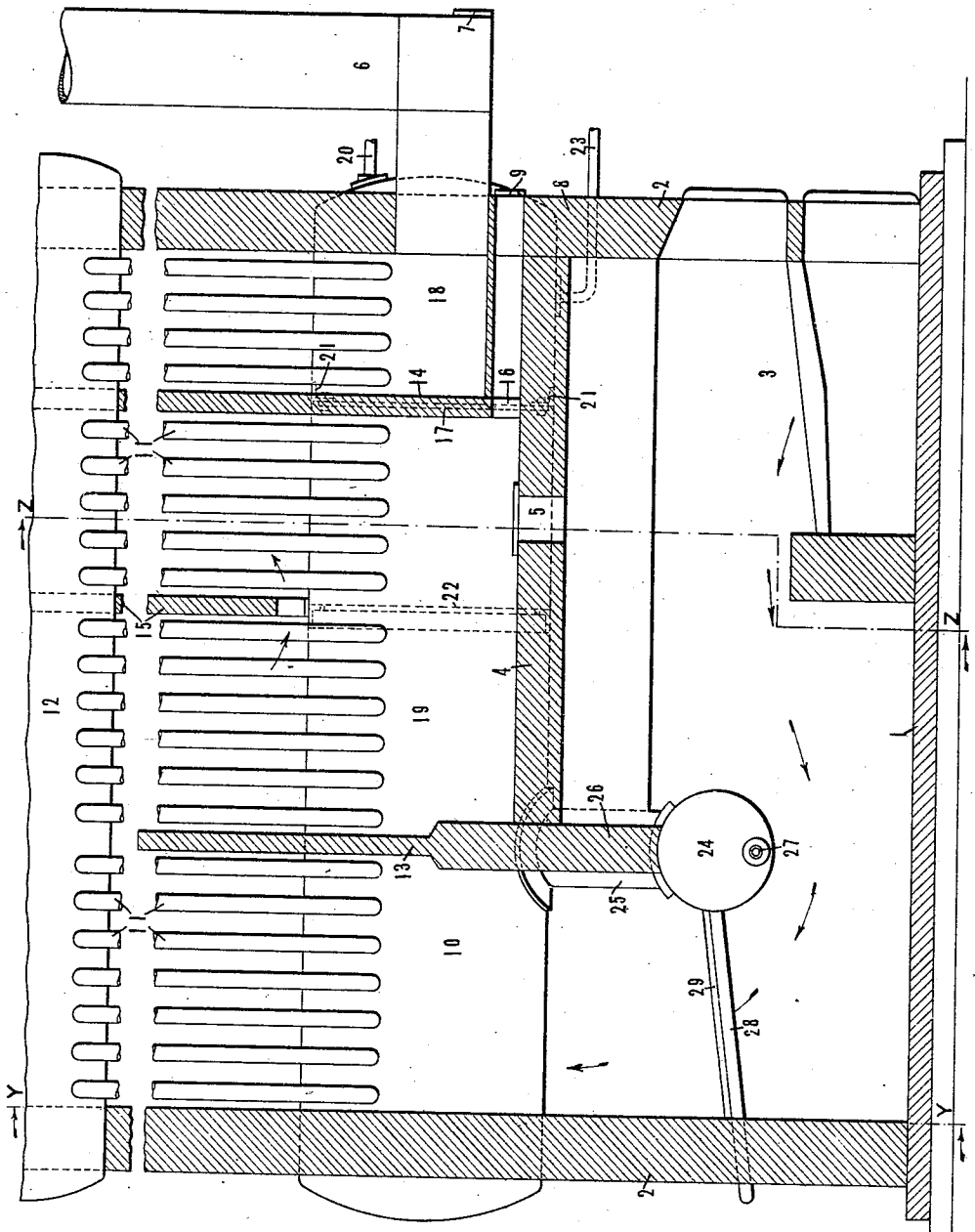

FIG. 1.

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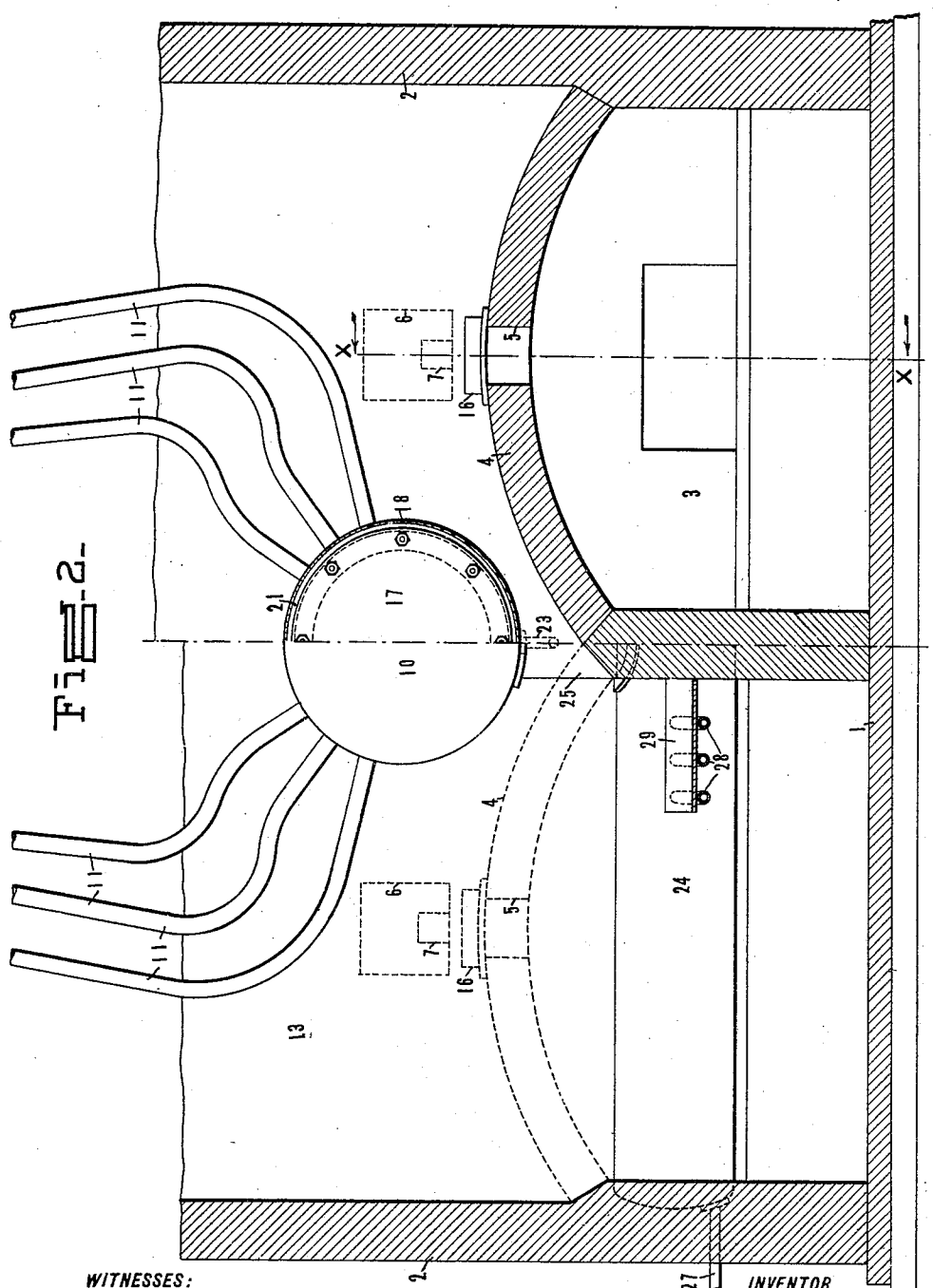

Fig. 2.

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UNITED STATES PATENT OFFICE.

ALISON B. STIRLING, OF PLEASANT MOUNT, PENNSYLVANIA.

BOILER CONSTRUCTION.

977,144. Specification of Letters Patent. **Patented Nov. 29, 1910.**

Original application filed December 18, 1909, Serial No. 533,932. Divided and this application filed May 20, 1910. Serial No. 562,373.

To all whom it may concern:

Be it known that I, ALISON B. STIRLING, a citizen of the United States, residing at Pleasant Mount, in the county of Wayne and State of Pennsylvania, have invented certain new and useful Improvements in Boiler Construction, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in boiler construction, and with regard to the more specific features thereof, to horizontal boilers of the water-tube type.

One of the objects of the invention is to provide a practical boiler which will have a high heating efficiency, the construction being such that the water will have a definite and positive circulation and the coolest gases will be directed against the tubes containing the coolest water.

A further object is to provide simple and efficient protective means for the exposed parts of the boiler against the direct flow of the furnace gases.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings wherein is illustrated one of various possible embodiments of my invention—Figure 1 is a longitudinal section of the boiler setting, taken on line *x*—*x* of Fig. 2, the boiler proper being shown in side elevation; in Fig. 2 the portion to the left of the center line is a cross-section on line *y*—*y* of Fig. 1, and the portion to the right of the center line is a section on line *z*—*z* of Fig. 1.

Similar reference characters refer to similar parts in all views of the drawings.

Referring now to the drawings, 1 indicates the foundation or base which supports the furnace and the boiler setting 2. The fire-box is represented at 3, the upper wall of said fire-box being formed by an arch 4, in which is formed a closed aperture 5. A stack 6 leads from the setting of the boiler near the lower portion thereof above the fire-box. At this point it may be noted that while, in the present instance, two fire-boxes having independent stacks are employed, which stacks may, if desired, be connected with a common flue or chimney, these portions of the construction are similar in all respects, and a description of one side of the boiler, therefore, will suffice to impart a clear understanding of the invention.

Stack 6 is provided with a normally closed aperture 7, and the front wall 8 of the setting of the boiler is likewise provided with a normally closed aperture 9, said apertures being designed to permit of ready removal of dust and ashes from the setting.

In the central portion of the boiler is a longitudinally extending water-drum 10 from which lead a plurality of substantially vertically disposed tubes 11, the upper ends of which lead into a steam and water-drum 12 extending longitudinally of the upper portion of the setting. A pair of baffles 13 and 14 extend upwardly between tubes 11, and a baffle 15 extends downwardly between said tubes and is interposed between baffles 13 and 14. Baffle 14 is provided with an aperture 16 arranged in longitudinal alinement with the aperture 9 in wall 8. It will be observed that the arrangement of the baffles with respect to the tubes of the boiler provides channels so that the heated gases will pass progressively from the furnace through the spaces occupied by these tubes before the same are discharged from the boiler through the stack 6.

Water-drum 10 is provided with a transverse partition 17 which divides the same into front and rear compartments 18 and 19, respectively, this partition, in the present instance, being located immediately below the baffle 14 and adapted to compel the water flowing into the compartment 18, through a feed connection 20 located near the upper part of the water-drum 10, to flow in an upward direction through the series of water-tubes disposed forwardly of the said baffle. The partition 17, as shown, is removably secured to an angle iron 21 fastened to the shell of drum 10. A second angle 22 is fastened to the shell at another point, in the present case, in line with baffle 15. If desired, the position of the partition may be changed by detaching from angle 21 and securing to angle 22. It will be observed that the water circulates through the

tubes 11 of the boiler, in a direction opposite to that traveled by the heated gases from the furnace, and that the baffles are disposed in such manner that the coolest gases are brought into contact with the tubes containing the coolest water.

Blow-off pipe 23 leads from the compartment 18 of the water-drum 10 and, if desired, partition 17 may be provided with an aperture in its lower portion so that the entire drum may be blown off through said blow-off pipe 23 or through the transversely extending drum 24 which is connected to the water-drum 10 by a pipe connection 25 in a position substantially beneath the rearward end of the arch 4. A wall 26 is supported upon said drum 24 and extends upwardly into contact with the end of said arch and beyond said arch to form the baffle 13. This drum 24 is provided with a blow-off pipe 27. Closed end circulating tubes 28 extend rearwardly from the central portion of said transverse drum 24 and into the rear boiler wall for support. These tubes have a slight downward inclination, and supported thereon is a baffle 29 composed of refractory tiles. As the said tubes and baffle are located substantially beneath the water-drum they effectually prevent the latter from being injured by the direct flow of the furnace gases, and it is to be noted further that the arrangement of the transverse drum 24 protects the wall 26 and the arch 4 from injury due to the high temperature obtaining at this point.

In operation it will be seen that the gases from the furnace pass beneath the transverse drum 24 and upwardly to the tubes 11 of the boiler. Said gases will be deflected away from the drum 10 by means of the baffle 29 and tubes 28. The water in said tubes becoming heated, flows upwardly into the drum 24, cooler water from said drum passing downwardly in said tubes along the lower wall thereof. The water from said tubes will have acquired a high degree of heat, and passing upwardly through the connection 25, will greatly aid in the circulation of the water from the rear portion of the drum 10 upwardly through the tubes 11, thereby causing active circulation in the rear portion of said drum and preventing injury to the walls thereof at this point. It will be seen that the gases, while surrounding the vertical tubes 11, will first pass upward between baffle 13 and the rear of the boiler setting, then downward between baffles 13 and 15, then upward between baffles 15 and 14, and finally downward between baffles 14 and the front of the boiler setting to the stack 6; and as the water within the boiler is circulating through the tubes in an opposite direction to that of the gases, it, of course, follows that the coolest gases will be in contact with the tubes containing the coolest water.

It will accordingly be seen that I have provided a construction well adapted to attain, among others, all the ends and objects above pointed out in a simple, yet efficient manner. By reason of the fact that the coolest gases are always in contact with tubes containing the coolest water, there is provided an economical and thorough abstraction of the heat carried by said gases. It will further be seen that by providing a transverse drum located beneath the wall 26 and by connecting it to the water-drum near the rear end of the same, said wall, water-drum and arch 4 are effectively protected from the effects of the high temperature obtaining in this region.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

It is to be noted that certain features relating to this invention have been described and claimed in my copending application for improvements in boiler construction, filed December 18, 1909, Serial No. 533,932, of which this application is a division.

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

1. In a steam boiler, in combination, a firebox, a longitudinally extending water-drum, a transversely extending drum located beneath the rear portion of said water-drum and connected therewith, the ends of said second drum projecting beyond the sides of said first drum, and closed end water-tubes extending rearwardly from said transverse drum.

2. In a steam boiler, in combination, a firebox, a water-drum, a transversely extending drum located beneath said water-drum, a wall supported by said transverse drum extending up to and around said water-drum, an arch extending beneath said water-drum rearwardly to said wall, a water connection between said drums, and closed end tubes extending rearwardly and downwardly from said transverse drum.

3. In a steam boiler, in combination, a firebox, a water-drum, a transversely extending

drum located beneath said water-drum, means connecting said drums, closed end tubes extending rearwardly from said transverse drum, and a baffle supported by said tubes in parallel relation therewith.

4. In a steam boiler, in combination, a fire-box, a water-drum, a transversely extending drum located beneath said water-drum, means connecting said drums, closed end tubes extending rearwardly from said transverse drum and positioned beneath the rear portion of said water-drum, and a baffle supported by said tubes adapted to protect said drum from the direct flow of the furnace gases.

5. In a steam boiler, in combination, a fire-box, a longitudinal water-drum, a transverse drum positioned beneath the rear portion of said water-drum and connected therewith, a steam and water-drum, water-tubes extending upwardly from said water-drum to said steam and water-drum, closed end water-tubes extending rearwardly from said transverse drum, and a wall supported upon said transverse drum and projecting upwardly among said first set of tubes.

6. In a steam boiler, in combination, a fire-box, a longitudinal water-drum, a transverse drum positioned beneath the rear portion of said water-drum and connected therewith, a steam and water-drum, water-tubes extending upwardly from said water-drum to said steam and water-drum, closed end water-tubes extending rearwardly from said transverse drum, and a wall supported upon said last drum and projecting upwardly among said first set of tubes, said first water-tubes being disposed upon opposite sides of said upwardly projecting wall.

7. In a steam boiler, in combination, two distinct fire-boxes, each provided with an arch extending rearwardly from the front boiler wall, a longitudinal water-drum positioned above and between said arches, a transverse drum positioned substantially beneath the rear end of said arches, a wall supported by said last drum and rising to meet said arches, means embedded in said wall adapted to connect said drums, and closed end tubes extending rearwardly from said transverse drum and having their outer ends supported in the rear boiler wall.

8. In a steam boiler, in combination, a fire-box, a water-drum, a partition dividing said water-drum into front and rear chambers, a transversely extending drum connected to said rear chamber and disposed beneath the same, a steam and water-drum, water-tubes extending upwardly from said water-drum to said steam and water-drum, closed end water-tubes extending rearwardly from said transverse drum, and a feed water connection to said front chamber.

In testimony whereof I affix my signature, in the presence of two witnesses.

ALISON B. STIRLING.

Witnesses:
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EVERETT J. PECK.