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R. W. NICHOLS.

WATER CIRCULATING MEANS.

APPLICATION FILED DEC. 18, 1905.

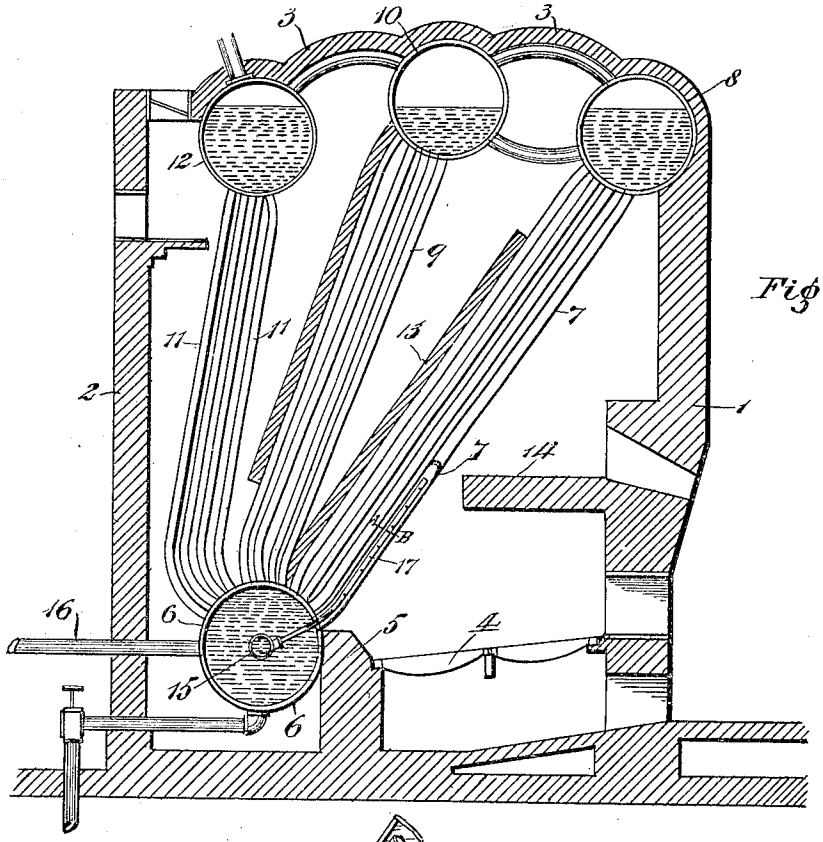


Fig 1

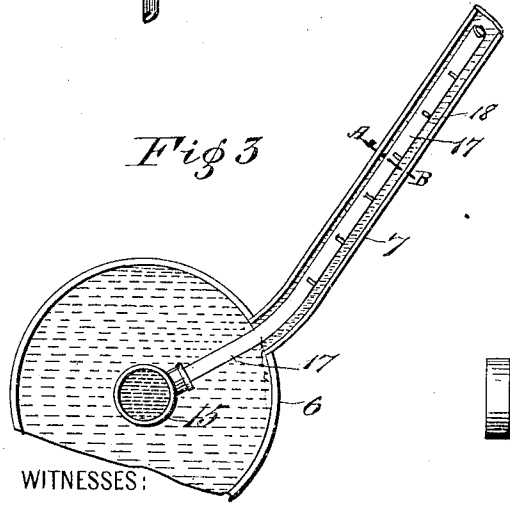


Fig 3

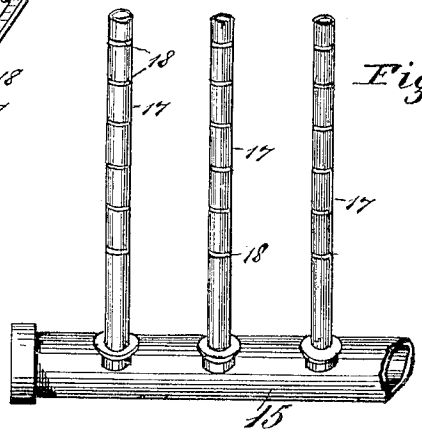


Fig 2

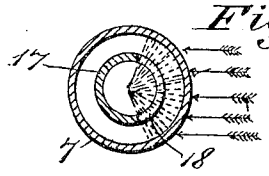


Fig 4

WITNESSES:

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ROBERT W. NICHOLS, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF ONE-HALF TO JOHN F. FOX, OF INDIANAPOLIS, INDIANA.

WATER-CIRCULATING MEANS.

No. 856,900. Specification of Letters Patent. Patented June 11, 1907.

Application filed December 18, 1905. Serial No. 292,280.

To all whom it may concern:

Be it known that I, ROBERT W. NICHOLS, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Water-Circulating Means, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a means for inducing or promoting the circulation of the water in those tubes of water tube boilers that are subjected to the more intense heat of the furnace and consists in the means hereinafter more particularly described and pointed out in the claims.

The object of this invention is to provide a means whereby the circulation of the water in those tubes of water tube boilers that are exposed and subjected directly to the intense heat generated by the furnace, or the direct heat produced and escaping from the furnace, will be artificially produced or facilitated. I obtain these objects by means of the device illustrated in the accompanying drawings in which similar numerals of reference designate like parts throughout the several views.

Figure 1, is a sectional elevational view of the water tube boiler and its setting. Fig. 2, is an enlarged detail front view of the manifold and distributing tubes thereof constituting my water circulating apparatus. Fig. 3, is an enlarged sectional end view of the water drum of a water tube boiler and the forward upwardly extending row of tubes and showing the manifold and feed water distributing tubes applied thereto; and, Fig. 4, is a section of a front water tube taken through the line AB; see Figs. 1 and 3.

1, designates the front and 2 the back walls of the setting.

3, designates the top inclosing or cover roof of the setting.

4, designates the grates, and 5, the bridge wall of the furnace.

The lower water drum 6, of the boiler is situated within the setting at the rear bottom portion thereof in such position therein as to slightly project over the top portion of the bridge-wall 5. The tubes 7, extend from the drum 6 in a forward and inclined direction to the forward upper drum 8, and tubes 9, connect said drum 6, with the immediate steam drum 10. The rear tubes 11 connect the drum 6 with the upper rear top drum 12. A baffle plate 13 extends from the drum 6, vertically and rearwardly of the tubes 7 to a position near the top forward steam drum 8. A fire arch 14 is situated directly over the grates 4. The front row of tubes 7, will therefore be subjected directly to the intense heat generated by the fire on the grates 4. These front rows of tubes 7 being subjected directly to this intense heat, soon become very much hotter than the tubes to the rear of them and consequently the process of evaporation within them is much more rapid than that of the rest of the tubes of the boiler. In fact the evaporation is so rapid and excessive relative to the rest of the tubes of the boiler, that water condensed in the drum 6 will not ascend said tubes of its own accord or by the usual natural circulation due to gravity. In consequence of the failure of the water to circulate through this forward row of tubes, said tubes become intensely hot and are frequently raised to a red heat so that they burn-out and render the boiler unfit for use, and this evil is more marked in such cases as where it is necessary to work the boiler to its full evaporative capacity. In order to promote the circulation in these tubes, particularly those portions or sides of said tubes exposed to and impinged by the direct heat of the furnace, I provide a means whereby the water is forced not only to circulate through these more exposed tubes, but also to direct the incoming feed-water in flat radial sprays against the interior of such exposed tubes situated directly back of those portions of said tubes impinged by the direct heat of the furnace, which means I will now proceed to describe.

A manifold 15, extends centrally within the drum 6 and is connected at one of its ends to a water feed or supply pipe 16 which pipe is suitably connected with a feed pump or injector, or other means whereby feed water is supplied through the boiler. The tubes 17 are connected to the manifold 15 at their bottom ends and project centrally, or nearly so, and upwardly into the forward row of tubes 7 and the said feed tubes or distributers 17 are open at their top ends and provided at their forward sides with transversely extending saw-cuts which are arranged to be situated at suitable intervals apart along

their front sides so that the jets of water ejected from said transverse saw cuts of said feed-water tubes will impinge directly against the inner sides of those portions of the tubes situated back of the surfaces nearer to, exposed to and impinged by the direct heat or flame from the furnace. See particularly Figs. 2, 3, and 4.

Referring particularly to Fig.4, it will be noted that the distributing tube 17, situated within the tube 7, has its spray opening or slit, directed toward that portion of the tube 7 exposed to the greater intense heat of the furnace, so that the water ejected through the slit 18 of the distributing tube 17 against the interior front portion thereof, strikes the tube in the form of a flat segmental spray, thereby insuring the application of the cooler feed water to the interior of the intensely heated, forward, exposed, surfaces of the tubes 7. By means of this arrangement, said tubes 7, or any tubes exposed in a similar way to the intense heat of the furnaces, are positively supplied with an amount of feed water necessary to keep said exposed tubes and maintain them at a temperature equal to or less than that of the less exposed tubes of the boiler.

I claim:—

In a water tube boiler, the combination with the lower water drum and the front upwardly extending tubes exposed to and impinged by the direct heat of the furnace, of a horizontally extending manifold situated within said water drum and a feed-water supply pipe connected to said manifold, a series of branch or water distributing pipes open at their top ends and connected at their bottom ends to said manifold to extend upwardly and centrally within said front upwardly extending tubes exposed to and impinged by the heat from the furnace, each of said water distributing tubes provided with a series of transverse slits, saw cuts or water jet openings arranged at suitable distances apart along said water distributing tubes, said slits or saw-cuts so situated that the radial flat water-jets ejected from them will impinge directly against those portions of the interior surfaces of the water tubes situated directly back of the exterior surfaces thereof exposed to the direct heat of the furnace, substantially as and for the purpose set forth.

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

ROBERT W. NICHOLS.

Witnesses:
THOMPSON R. BELL,
JOHN F. FOX.