(No Model.)

W. J. AUSTIN.

STEAM BOILER.

No. 460,299. Patented Sept. 29, 1891.

Fig. 1.

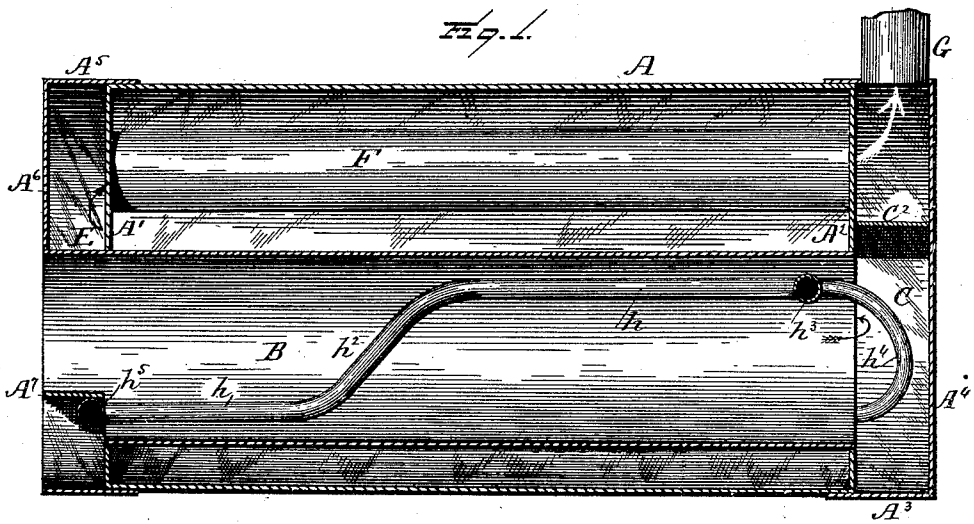


Fig. 2.

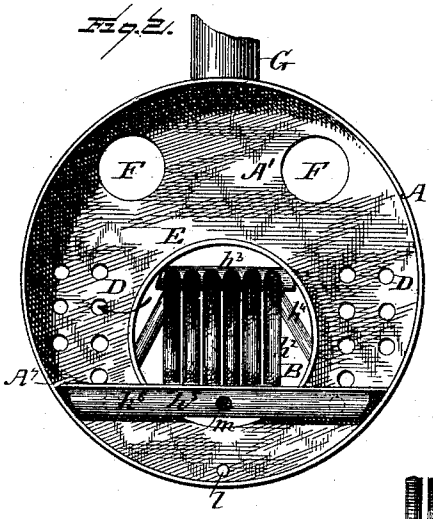


Fig. 3.

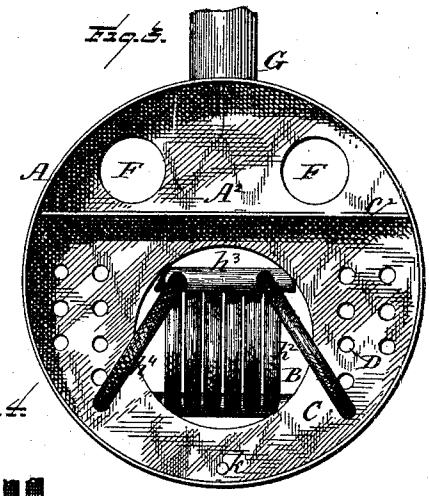
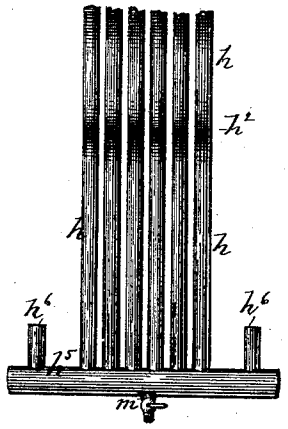


Fig. 4.



Witnesses:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM JARVIS AUSTIN, OF FOND DU LAC, WISCONSIN.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 460,299, dated September 29, 1891.

Application filed March 3, 1887. Serial No. 229,638. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JARVIS AUSTIN, a citizen of the United States, residing at Fond du Lac, in the county of Fond du Lac, State of Wisconsin, have invented certain new and useful Improvements in Steam-Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to flue and tubular boilers; and the objects of my improvement are to obtain a large amount of heating-surface, effect economy in fuel, and produce a good circulation in the boiler and the grate-bars thereof. I accomplish these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a boiler constructed in accordance with my invention. Fig. 2 is an end view of the front portion of the same with the front plate of the smoke-chamber removed. Fig. 3 is an end view of the rear portion of the same with the rear plate of the smoke-chamber removed. Fig. 4 is a top view of the front end of the grate-bars.

In said drawings, A represents the shell of the boiler, preferably in the form of a horizontal cylinder of uniform diameter from one to the other, the ends A′ and A^2 being perforated to receive the flues hereinafter described. The largest screw B is nearly half the diameter of the shell A, and is secured to the ends A′ A^2, so that its bottom is from three to five inches from the bottom of the shell and parallel therewith. This flue B constitutes the fire-box of the boiler, and conducts the products of combustion to the rear end of the boiler. To said end of boiler is secured a short cylinder A^3 to form, with the rear plate A^4, a smoke-chamber C, from which the products of combustion are returned to the front end of boiler through series of small horizontal flues D, passing through the heads of the boiler alongside of the large flue B, as a horizontal plate c^2 across this smoke-chamber prevents the flame and smoke from ascending directly to the stack G. To the front end of the boiler is also secured a short cylinder A^5, to form a smoke-chamber E to arrest and direct the products of combustion back to the rear end of the boiler through the flues F. To complete the chamber E, a segmental plate A^6 is secured to the front end of the cylinder A^5, and the lower edge of said plate bears upon a shelf A^7, resting upon the front end of the grate-bars, while its middle portion encircles the front edge of the large flue B that is extended for that purpose beyond the front of the boiler-shell. The flues F are intended to be mostly within the steam-space of the boiler, and by this means the steam becomes superheated.

To produce a rapid circulation of the water in the boiler and increase its steaming capacity, said boiler is provided with tubular grate-bars *h*, that are placed within the flue B and extend substantially the whole length thereof. The front portion extends horizontally any desired length to support the combustibles. The middle portion extends upward at an angle of about forty-five degrees to form a bridge-wall h^2, and the rear portion extends substantially horizontally to the rear end, where they terminate into a larger cross-tube h^3. The rear end of the grate-bars or this tube h^3 is connected with the rear end of the boiler by means of two bent tubes h^4, that enter therein near its bottom. The front ends of the grate-bars are connected together to a larger tube h^5, that lies transversely across the front end of the boiler. This tube is connected with the interior of the boiler by means of two short tubes h^6, that enter it near its bottom.

By having the grate-bars in one piece, from one end to the other, and the upwardly-bent portion h^2 between the two ends, the grate-bars are capable of a large amount of expansion without straining their connections with the boiler. The circulation of water through them is rapid and prevents the accumulation of scale and sediment, and as the grate-bars are connected at both ends with the boiler a rapid circulation lengthwise thereof is also produced.

Water is fed to the boiler through a suitable opening, as *k*, and the contents of the boiler can be blown off from both ends through cocks placed upon the openings *l*, near the bottom of the boiler, and through the opening *m* in the cross-pipe h^5 at the front end of the grate-bars.

Having now fully described my invention, I claim—

1. In a steam-boiler, the combination of the horizontal shell A, and the fire-box flue B therein, with a series of grate-bars consisting of tubes of uniform diameter throughout their length, having a portion at each end extending horizontally and the middle portion bent upwardly, the ends of said grate-bars being connected to the boiler, substantially as and for the purpose described.

2. The combination of the shell of a boiler and the fire-box flue therein, with a series of tubular grate-bars having a portion at each end extending substantially horizontally and the middle portion bent upwardly, cross-tubes at the ends of said grate-bars, and bent tubes connecting them with the ends of the boiler, substantially as and for the purpose described.

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

WILLIAM JARVIS AUSTIN.

Witnesses:
W. F. SEALY,
THOS. WATSON.