J. D. Beers,

Steam-Boiler Fire-Tube.

No. 49,847. Patented Sep. 12, 1865.

Fig 2.

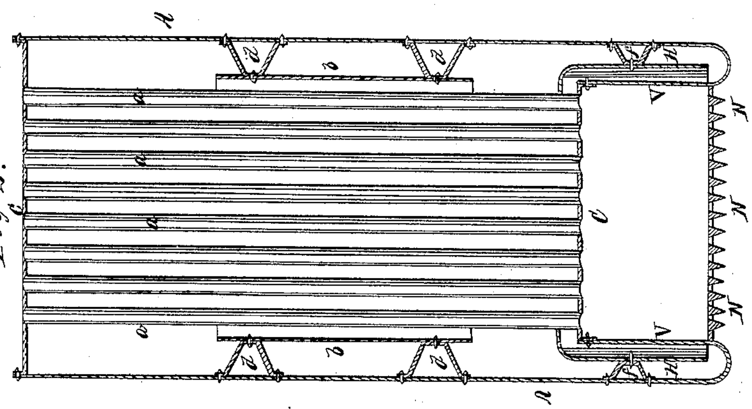


Fig 1.

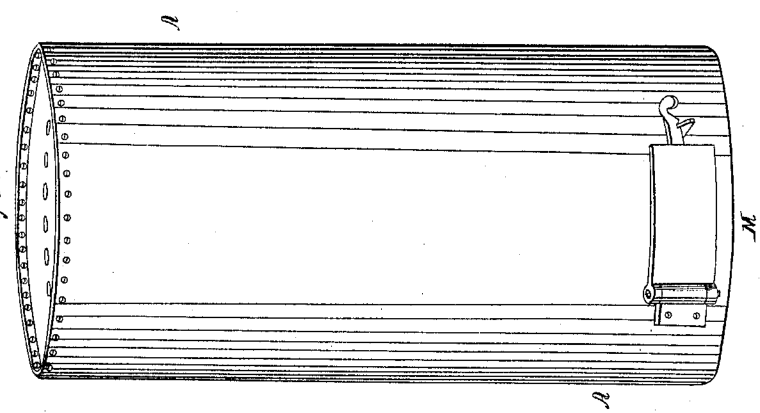


Fig 3.

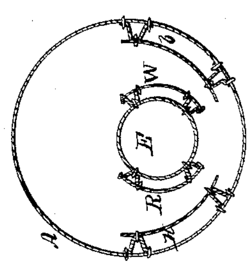
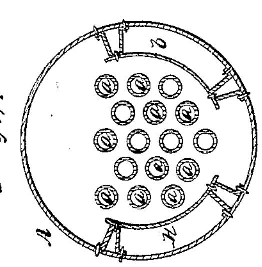


Fig 4.



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UNITED STATES PATENT OFFICE.

JOHN D. BEERS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **49,847**, dated September 12, 1865.

To all whom it may concern:

Be it known that I, JOHN D. BEERS, of the city of Philadelphia and State of Pennsylvania, have invented a new and improved mode of increasing the steam-generating capacity of boilers by introducing within their water-spaces what I denominate a "Channel and Current Maker;" and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

The channel and current maker is adapted to boilers generally; and it consists in suspending within the water-spaces within the boiler a sheet-iron plate or plates, by which channels are made within said spaces and a continuous circulation is given to the water. These plates take the form of the water-spaces in which they are placed, whether that be a plane, a cylinder, or a composite form.

With a view to the comprehension of the best modes of location of the channel and current maker within the water-spaces of the various kinds of boilers in use, I have chosen its representation in a vertical tubular one of cylindrical form having a fire-box with water-space surrounding the fire, and also sectional views of two other kinds of boilers lying in a horizontal position, described hereinafter.

Figure 1 is a drawing of a vertical tubular boiler in perspective, with the fire-box complete; and Fig. 2 is a section on a vertical plane through its center. The letters of reference designate the same parts on Figs. 1 and 2, and Figs. 3 and 4 will be described separately.

A, Fig. 1, is the outside or shell of the boiler, having tubes *a*, Fig. 2, filling the central portion thereof within the plate or channel and current maker; *b*, their ends, terminating in the upper and lower heads C of the boiler, to which they are fastened in the usual way, these tubes forming flues for the passage of the products of combustion from the fire-box below.

b is a cylindrical plate of sheet iron, of uniform depth, suspended within the water-space between the outer circle of tubes *a* and the shell A of the boiler. It is fastened to and held in position by a sufficient number of brackets or stays, *d*, which are riveted to the shell A. The top or upper edge of the plate *b* is about twelve inches below the mean water-line of the boiler and the lower edge of it terminating about twelve inches above the lower head C. The space between *b* and A is from four to six inches, suiting a boiler of four feet diameter, and will be varied proportionately as the size is increased or diminished, the object being to cause a free upward current of the water through the spaces between the tubes *a* and over the edge of *b* and down the channel between A and *b*, and again entering the spaces between the tubing and passing upward continuously.

M, Fig. 1, is the door by which the fuel is introduced into the fire-box and deposited on the grating N, Fig. 2. This grating is fitted up and held in place in the usual manner for tubular boilers.

The water-space between A and V is formed into two channels by the suspension therein of the cylindrical plate H, around the lower termination of which the two channels have a free communication. This plate is fastened to and held in position by the brackets or stays *f*, which are riveted to A. The upper termination of H is curved to prevent any neutralizing action of the downward current between A and *b* and upward current from around the fire-box, and when operating the circulation of the water will be downward in the outer channel and upward in the inner channel, discharging into the spaces between the tubing continuously.

It will be seen from the foregoing description that the channel and current makers *b* and H produce substantially the same effects in their relative positions, differing only in the one having an aggregate of heated surfaces in the tubing and the other a single heated surface on one side of the water-space.

Figs. 3 and 4 are sections of two well-known boilers in use, and are introduced here to show the location of the channel and current maker within them. Fig. 3 is a section on a vertical plane through the center between the heads of a horizontal cylinder-boiler having a return-flue, E, near its center; and Fig. 4 is a section on a vertical plane through the center, between the heads of a horizontal tubular boiler. The channel and current maker within these two boilers is supported and held in place by stays, as in *b* and H in Figs. 1 and 2.

A, Fig. 3, is the outside or shell of the boiler,

and H and *b* are sheet-iron plates suspended in the water-space within it. They extend the whole length of the boiler between the heads, the upper edge of these plates terminating about three inches below the mean water-line of the boiler, and the space between their lower edges should be sufficient to allow a free ingress of the water into the channels they form with A. As the heating-surface of this boiler is its lower semi-diameter, the water, when in operation, will enter the channels at their lower edges and pass upward continuously. The flue E has two similar plates, R and W, forming channels on its sides. They extend the whole distance between the heads of the boiler, and the circulation of the water through these channels is upward continuously.

A, Fig. 4, is the shell of the boiler, and H and *b* are sheet-iron plates suspended in the water-space and extending the whole length between the heads of the boiler. These plates form channels on the sides of A, and when operating the circulation of the water will be upward through the spaces between the tubing *a* and downward through the channel formed by the plates H and A and the plates *b* and A continuously.

Any other metal may be used in the place of iron for the plates described, and it will be understood that the width of the channel on the fire side, where there is a single heating-surface, as around the fire-box in Figs. 1 and 2, governs the motion of the current—a channel contracted in width increasing its rapidity and one of increased width decreasing it.

Having described the channel and current maker and its operation within the boiler, I make the following claims:

1. The combination of the tubes *a* with the plate *b*, the stays *d*, and the shell of the boiler A, as described and set forth.

2. The combination of the heating-surface V with H, *f*, and A, as described and set forth.

JOHN D. BEERS.

Witnesses:
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