

(No Model.)

T. I. LEIPER.  
Steam-Generator.

No. 227,437.

Fig. 1. Patented May 11, 1880.

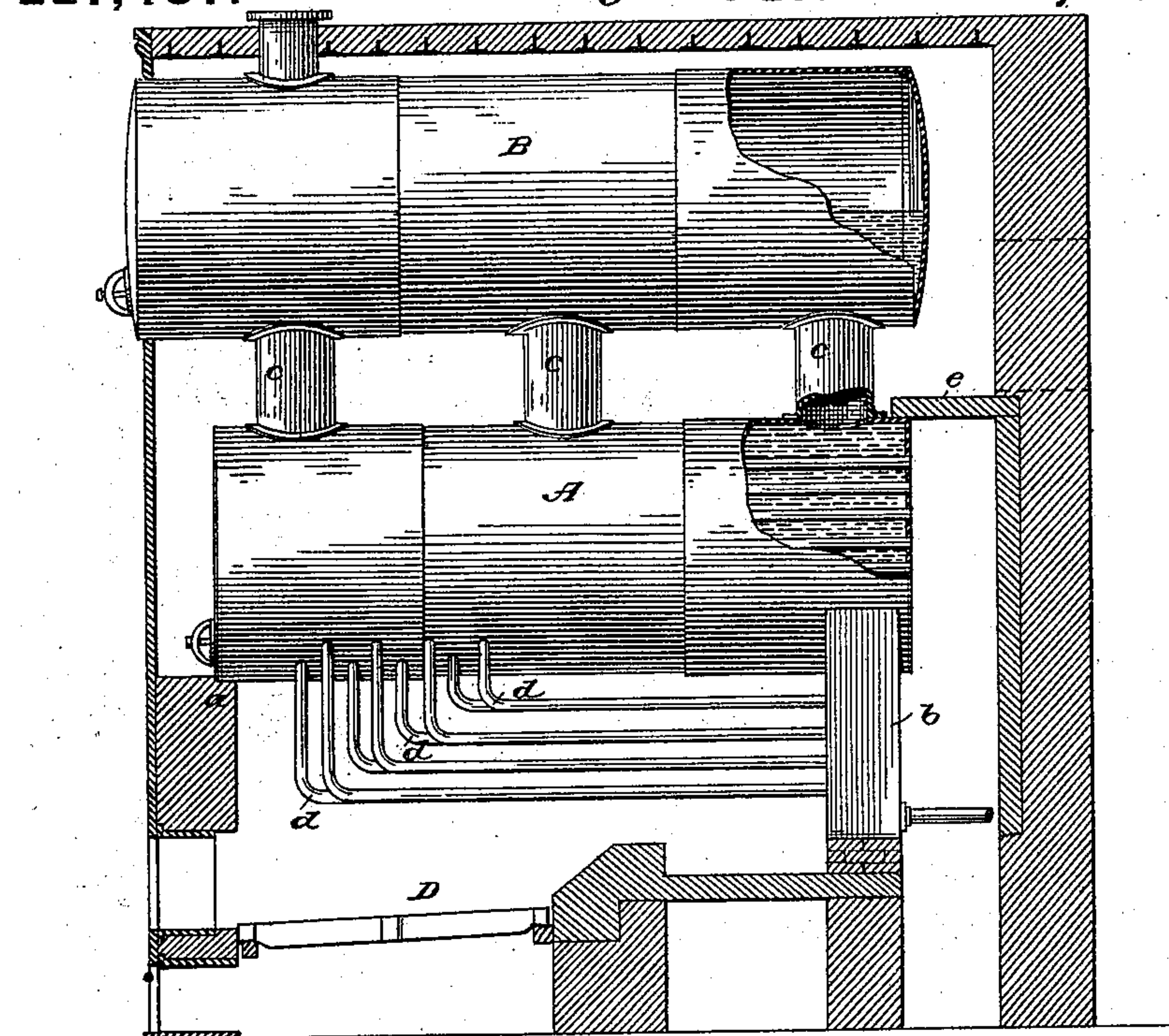
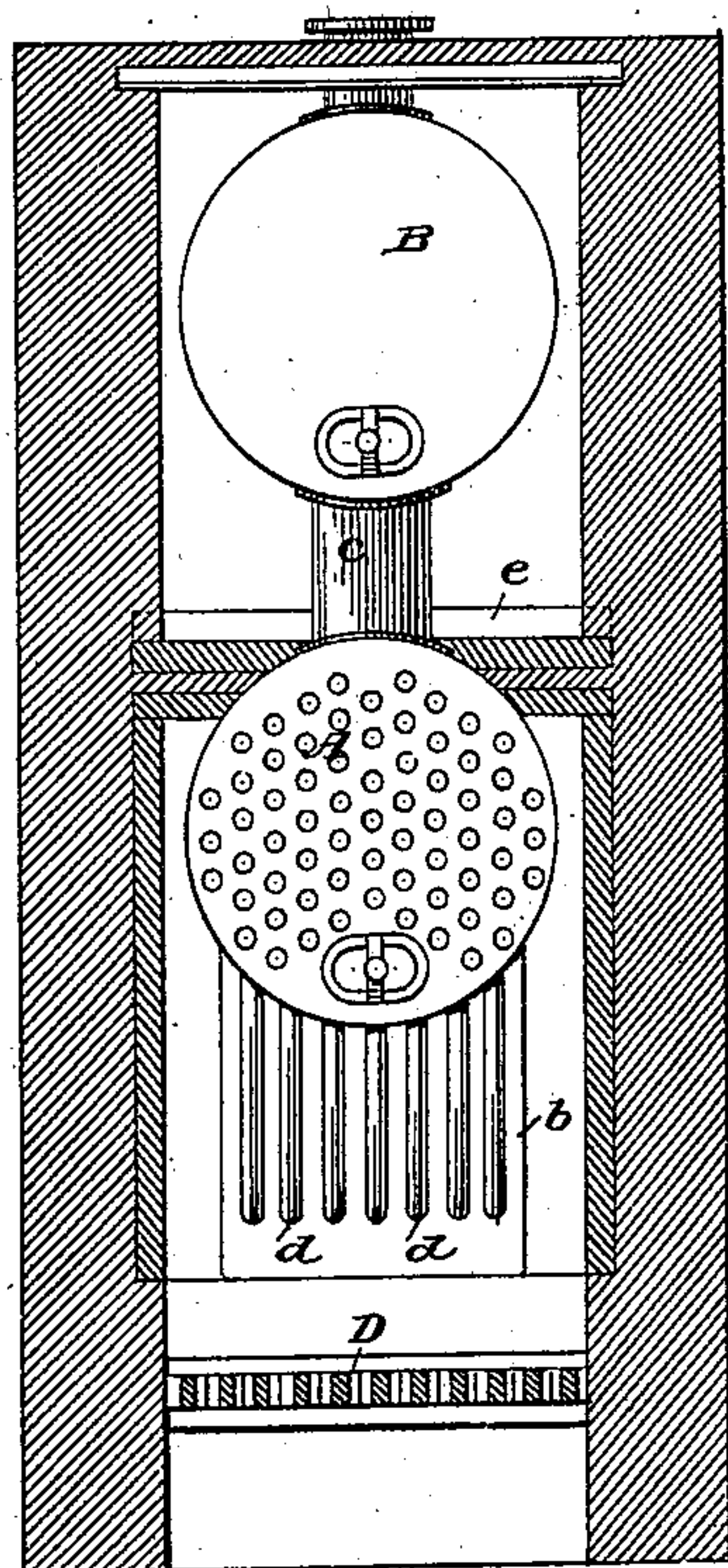


Fig. 2.



Attest:

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# UNITED STATES PATENT OFFICE.

THOMAS I. LEIPER, OF CHESTER, PENNSYLVANIA, ASSIGNOR TO ROBERT WETHERILL & CO., OF SAME PLACE.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 227,437, dated May 11, 1880.

Application filed March 22, 1880. (No model.)

*To all whom it may concern :*

Be it known that I, THOS. I. LEIPER, of Chester, in the county of Delaware and State of Pennsylvania, have invented a new and  
5 useful Improvement in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to steam-generators. It has for its object the evaporation of an in-  
10 creased quantity of water for a given weight of fuel by a simple and effective construction of the apparatus.

It consists of a combination of cylinder and tubular boilers with circulation-pipes and con-  
15 nected water-back, all as hereinafter fully set forth.

In the drawings hereunto attached and forming part of this specification, Figure 1 represents the side elevation of my improved  
20 steam-generator, the walls inclosing the boilers being in section, and the shell of the boilers being in part broken away to show the interior structure. Fig. 2 shows a transverse section of the walls, with an end view of the  
25 boilers.

In these drawings, A represents a tubular boiler of ordinary construction. The front end rests upon an arched support of brick-work at  
30 a, and the rear upon a water-box, b. Above this tubular boiler is a cylinder-boiler, B, separated from it by a space, as shown in the figures, sufficient to admit the passage of the products of combustion. The boiler B is con-  
35 nected to the tubular boiler by short pipes c c, by which also it is supported.

Connected to the lower part of the tubular boiler A are bent cylinder-tubes d, which enter the shell of the boiler in that part over the fire-  
40 grate, and extend in a horizontal direction to the rear, where they enter the water-box b. This water-box is of the relative dimensions shown in Figs. 1 and 2, and spaces are left upon each side for the passage of the pro-  
45 ducts of combustion into the rear of the fire-chamber.

The horizontal fire-partition e is arranged between the rear wall and the rear end of the tubular boiler to turn the products of combus-  
50 tion into the tubes of said boiler. The upper part of the fire-chamber is composed of transverse T-irons, which rest upon the side walls

and support the bricks which constitute the upper covering of the chamber.

A space is left between the upper part of the boiler and the bars of the top for the cir- 55 culation of the products of combustion. The products of combustion from the grate D pass underneath the boiler and strike the flues d d, thereby creating a circulation of water out of the water-box at the rear end and up into the 60 boiler. The heat passing from underneath the boiler returns through the tubes of said boiler to the front, and again back to the rear, between the upper and lower boilers, radiating around the upper and completely enveloping 65 it, so that the utmost possible use is made of the heat from the products of combustion also superheating the steam before they are dis- charged into the open air.

I am aware that upper and lower boilers 70 have been before used, and that in some situations bent tubes have been heretofore known, and my invention is limited to the construction shown—of an upper cylindrical boiler with the lower tubular and the bent flues— 75 whereby I am enabled to use a boiler not above twelve feet in length in the place of the long cylinder-boiler with increased effect in the evaporation of the water with the same amount  
80 of coal.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a tubular boiler, of a cylindrical boiler placed above it and con-  
85 nected therewith, and of bent tubes connecting the tubular boiler and the water-box, as and for the purpose set forth.

2. The combination of the tubular boiler A, the bent tubes d d, water-box b, the partition e, and the cylinder-boiler B, as set forth. 90

3. The combination of the boilers A and B with the bent tubes d and the water-box b, all arranged within the fire-wall, as shown, and the air-space between the boiler B and the T-iron supports, as set forth. 95

In testimony whereof I have signed my name to this specification in the presence of two sub-  
scribing witnesses.

THOS. I. LEIPER.

Witnesses:

ROBT. WETHERILL,  
PERRY M. WASHABAUGH.