C. M. Miles,

Steam-Boiler Water-Tube.

No. 43,624. Patented July 19, 1864.

Fig: 1

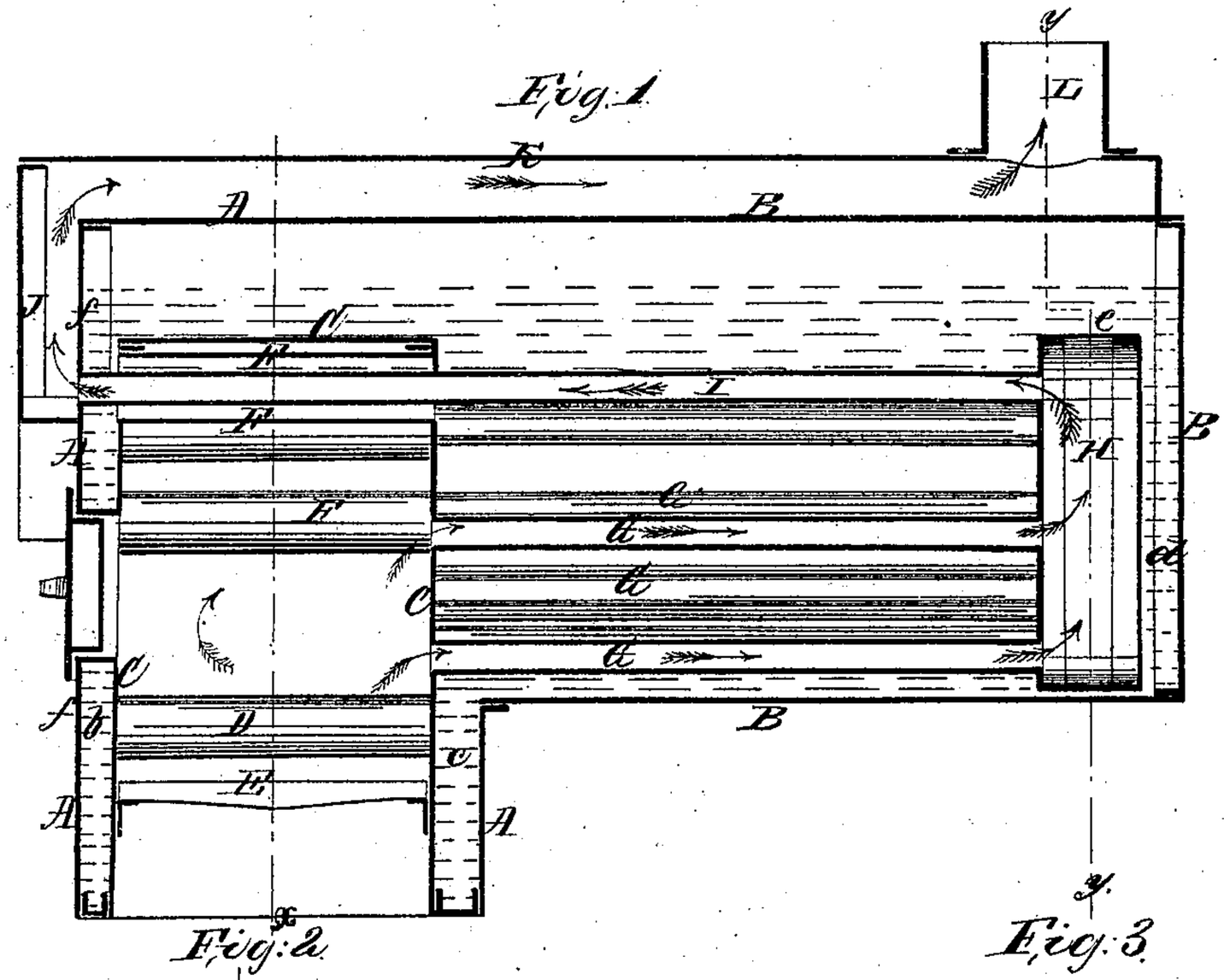


Fig: 2.

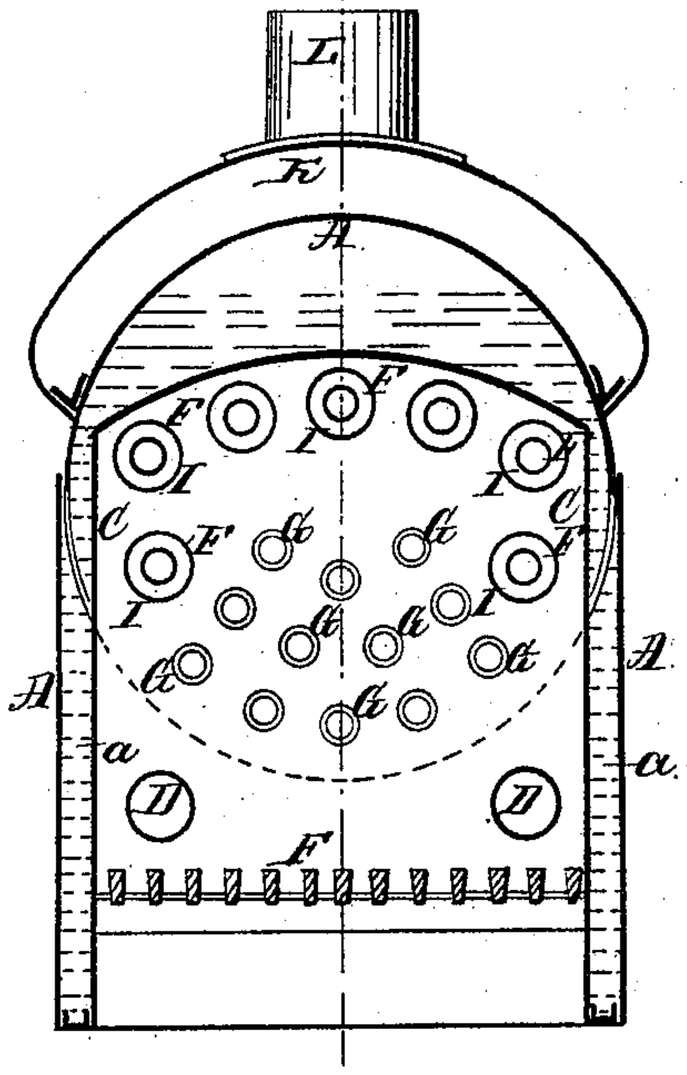
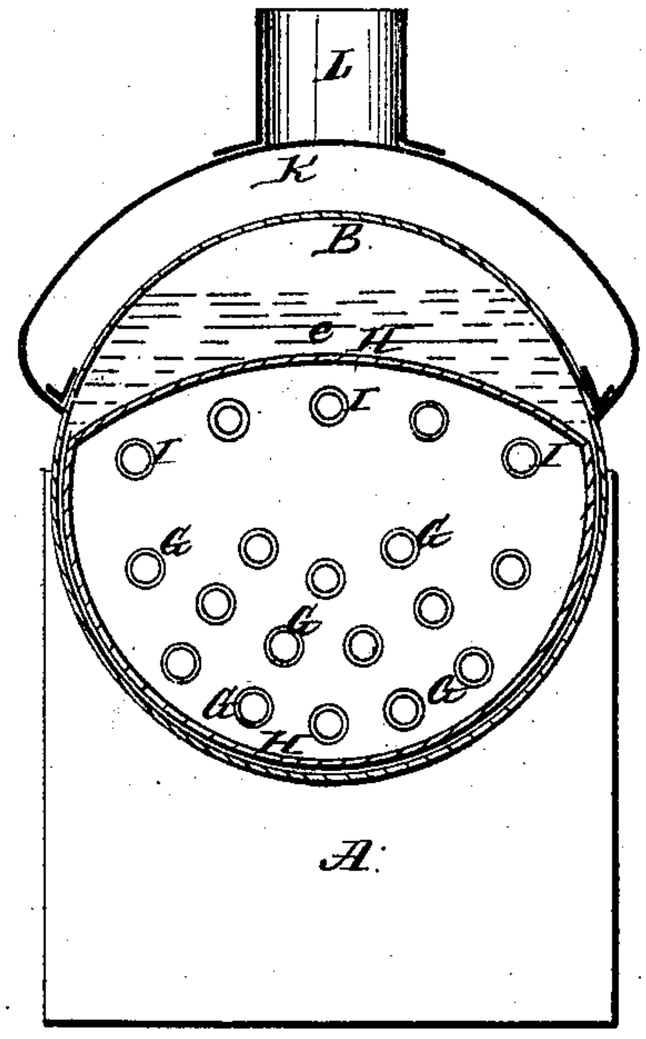


Fig: 3.



Witnesses:
J. W. Coombs
Geo. W. Reed

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AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

CHARLES M. MILES, OF VINELAND, NEW JERSEY, ASSIGNOR TO HIMSELF AND CHARLES F. JONES, OF SAME PLACE.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **43,624**, dated July 19, 1864.

To all whom it may concern:

Be it known that I, CHARLES M. MILES, of Vineland, in the county of Cumberland and State of New Jersey, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical longitudinal section of a boiler constructed according to my invention. Fig. 2 is a transverse section of the same in the plane indicated by the line *x x* in Fig. 1. Fig. 3 is a transverse vertical section of the same in the planes indicated by the line *y y* in Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in a novel arrangement of water tubes, smoke or gas tubes, and smoke-box, in combination with the fire-box of a horizontal boiler, whereby I obtain a large heating-surface and utilize in a very high degree the heat of the escaping gaseous products of combustion before permitting them to escape to the chimney.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A B is the shell of the boiler, constructed of a form substantially like that of a locomotive-boiler.

C is the fire-box, having water-space *a a b c* at its sides, front, and back, as in a locomotive-boiler.

D D are water tubes running through the lower part of the fire-box at a short distance above the grate E, and connecting the water-space *b* in front of the fire-box with that *c* in rear of it.

F F are water tubes running through the upper part of the fire box, and connecting the front water space, *b*, with the main water-space within the cylindrical portion B of the shell of the boiler.

G G are smoke or gas tubes running from the back of the fire-box horizontally through the main water-space in the shell B to a smoke-box, H, arranged within the rear portion of the shell B. This smoke-box instead of being entirely in rear of the water-space, as in an ordinary locomotive-boiler, has a water-space, *d*, in rear of it, and a water-space, *e*, above it.

I I are return smoke or gas tubes running from the upper part of the front of the smoke-box H horizontally through the main water-space, through the larger water-tubes F F, in the upper part of the fire-box, and through the front plate, *f*, of the boiler, and communicating with the interior of a breeching, J, which is secured to the front of the boiler. This breeching may have the chimney on the top of it, but is represented in Fig. 1 as communicating with a flue, K, which covers the upper part of the shell, and communicates with a chimney, L, over the rear part of the shell. The boiler is filled with water to some distance above the fire-box and smoke-box, and the upper part of the shell A B is left for steam-space. When fire is made in the fire-box, the smoke and heated gaseous products of combustion all pass from the fire-box through the tubes G G to the smoke-box H, whence they return through the tubes I I to the breeching J, and thence either directly or through the flue K to the chimney, as indicated by arrows in Fig. 1. The whole of the fire-box, the tubes D, F, G, and I, and the smoke-box H all present heating-surfaces, which, combined, have a very extensive area. The water-tubes D and F are exposed not only to the flame and heated gaseous products of combustion, but to in a great measure the direct radiation from the fire on the grate, and hence a very rapid generation of steam takes place within them. The gaseous products of combustion on their arrival at the breeching have so much of their heat extracted that they are of little further use, unless it be to keep hot the steam-space in the upper part of the shell, and hence the boiler must be very economical of fuel.

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

The combination, in a horizontal boiler, of the fire-box C, gas and smoke tubes G G, smoke-box H, return-tubes I, and water-tubes D and F, the whole arranged substantially as herein specified.

CHARLES M. MILES.

Witnesses:

CHAS. F. JONES,

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