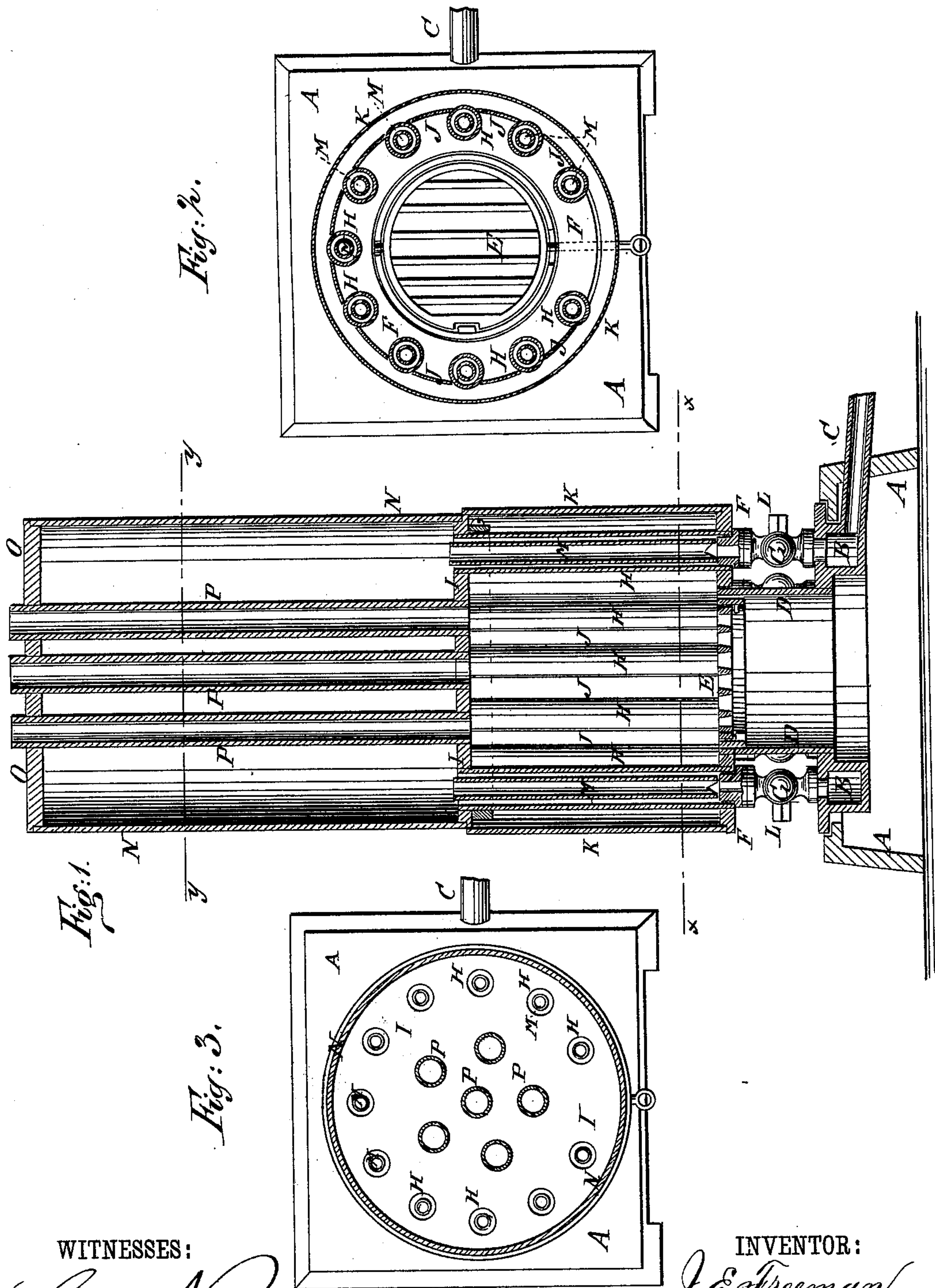


J. E. FREEMAN.  
Steam-Generator.

No. 220,599.

Patented Oct. 14, 1879.



WITNESSES:

*Chas. N. A. S.*  
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# UNITED STATES PATENT OFFICE.

JOHN E. FREEMAN, OF HERKIMER, NEW YORK.

## IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **220,599**, dated October 14, 1879; application filed March 5, 1879.

*To all whom it may concern:*

Be it known that I, JOHN E. FREEMAN, of Herkimer, in the county of Herkimer and State of New York, have invented a new and useful Improvement in Steam-Generators, of which the following is a specification.

Figure 1 is a vertical section of my improved steam-generator. Fig. 2 is a horizontal section of the same, taken through the line *x x*, Fig. 1. Fig. 3 is a horizontal section of the same, taken through the line *y y*, Fig. 1.

The object of this invention is to furnish steam generators or boilers, which shall be so constructed that the steam will be generated very rapidly, and at the same time less fuel will be required than with boilers of the ordinary construction, which will allow sediment and other obstructions to be readily removed, and which shall be simple in construction and readily repaired.

The invention consists in the combination of the cocks with the tubes connecting the tubes that form the vertical walls of the fire-chamber with the water-receiving chamber, and placed below the level of the fire-chamber, so as to be away from the heat, as hereinafter fully described.

I will describe the invention as applied to a vertical tubular boiler, but do not limit myself to boilers of that construction, as it is equally applicable to any vertical or horizontal tubular boiler.

A represents the base or bed of the generator, upon which rests a ring-chamber, B, which surrounds the upper part of the ash-chamber, and through which the water is discharged, when cleaning the tubes, through the pipe C. To the inner part of the chamber B is attached the lower end of a hollow cylinder, D, which forms the upper part of the ash-chamber, and with the upper end of which is connected the fire-grate E. With the upper end of the cylinder D is also connected a ring-plate, F, which is connected by bolts with the flange of the chamber B, and with which is connected the upper ends of a number of tubes, G.

The lower ends of the tubes G are connected with and open into the ring-chamber B. With the upper ends of the tubes G are connected the lower ends of the tubes H, which are arranged around and form the walls of the fire-chamber, sufficient space being left between

the two front tubes, H, to form a doorway for the furnace.

The upper ends of the tubes H are secured in holes in the plate I, which forms the top of the furnace and the bottom of the water-space of the boiler.

The spaces between the outer parts of the tubes H are closed by narrow plates, J, the lower ends of which are attached to the ring-plate F, and the upper ends are attached to the plate I.

The tubes H and the plates J are surrounded by a casing, K, to prevent waste of heat by radiation. The tubes G are provided with cocks L, to allow the tubes H to be readily cleared of sediment, the incrustation of the sediment being prevented by the lower parts of the tubes being away from the heat.

The tubes H are made larger than the tubes G, and within the said tubes H are placed smaller tubes M, the lower ends of which rest upon the upper ends of the tubes G, and are notched to allow the water to pass freely into the space between the tubes H and M, so that it will be exposed to the heat in thin sheets, and will thus be heated and vaporized very rapidly.

With the plate I is connected the shell N that forms the water space or chamber, and to the upper end of which is attached the plate or head O.

P represents the flues, the lower ends of which are secured in holes in the plate I, and their upper ends are secured in holes in the plate or head O, the said flues thus passing through the water-space of the boiler.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The combination of the cocks L with the tubes G, connecting the tubes H with the water-receiving chamber B, and placed below the level of the fire-chamber, so as to be away from the heat, no water-space being below the tubes, and no steam-tight joints below the discharge-cocks, substantially as herein shown and described.

JOHN EDWARDS FREEMAN.

Witnesses:

EDWARD SIMMS,

REUBEN WRIGHT.