(No Model.)

E. H. THOMPSON.

STEAM GENERATOR.

No. 384,941. Patented June 19, 1888.

Fig. 1.

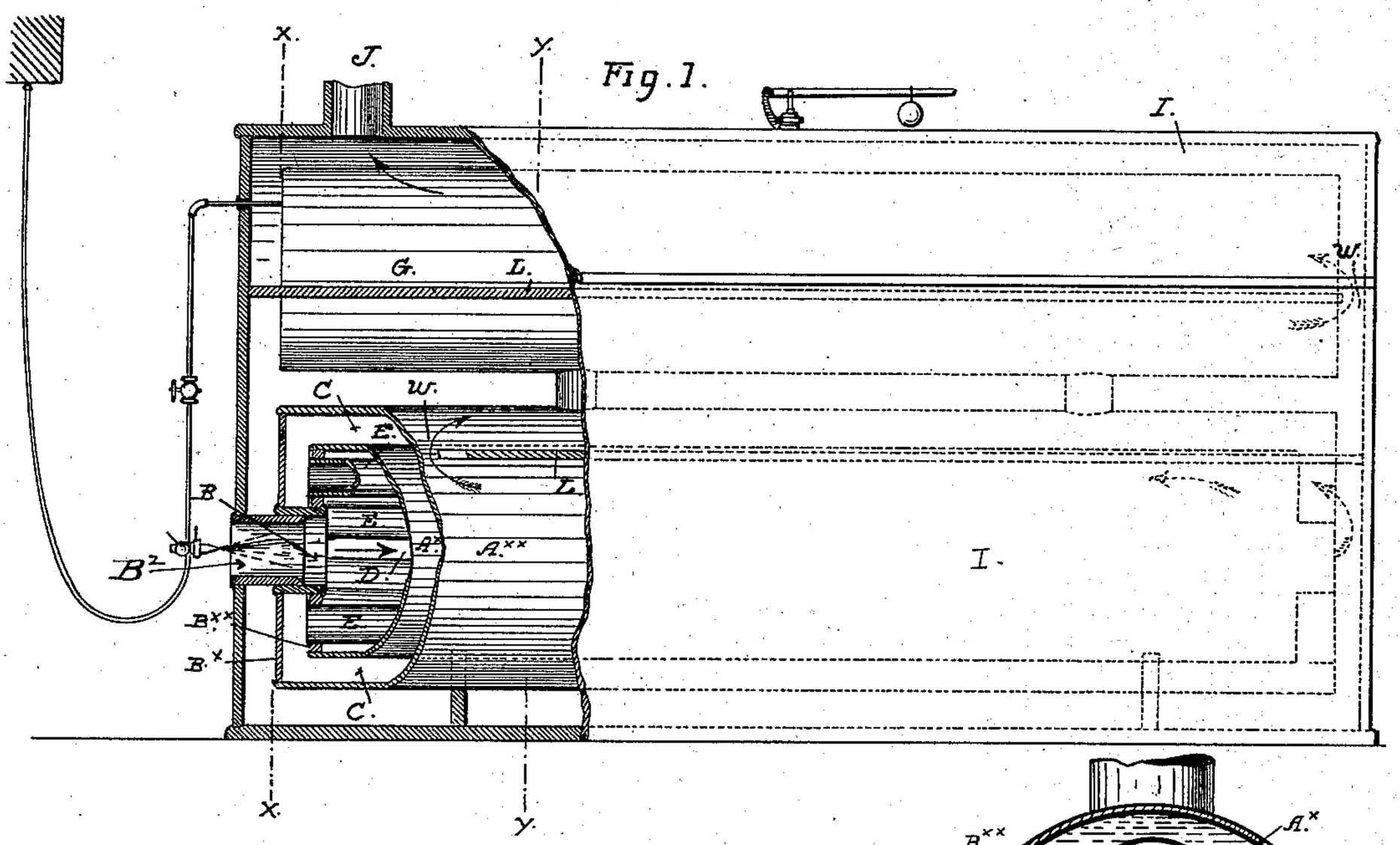


Fig. 2.

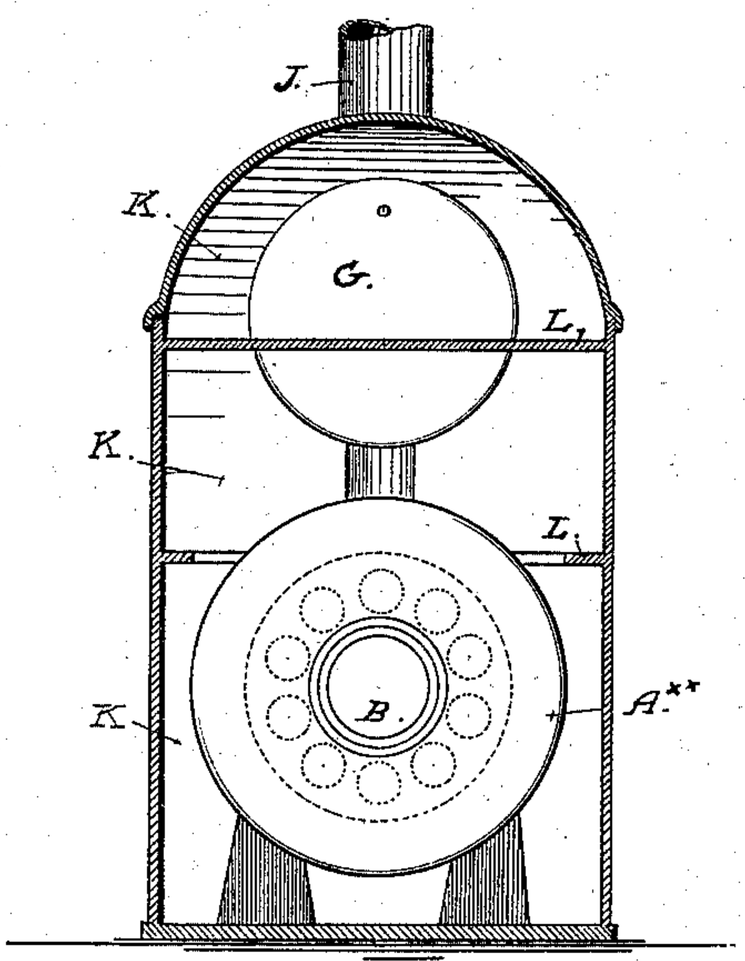


Fig. 4.

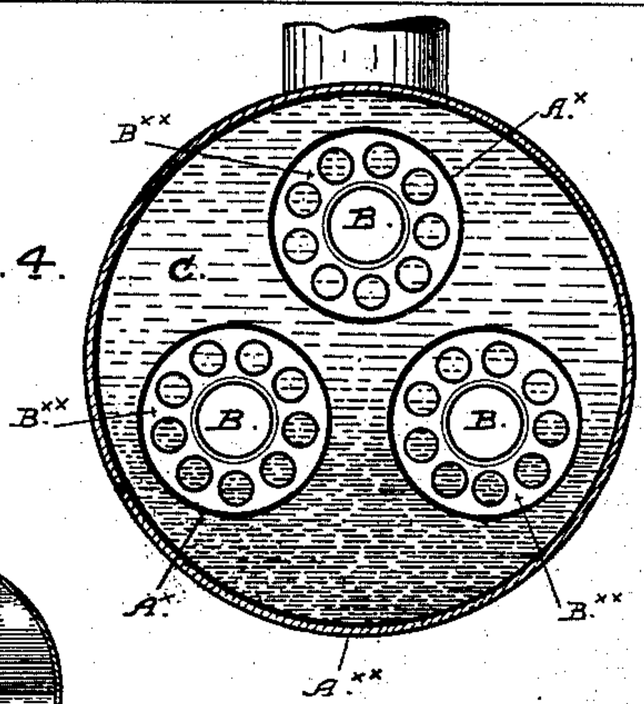
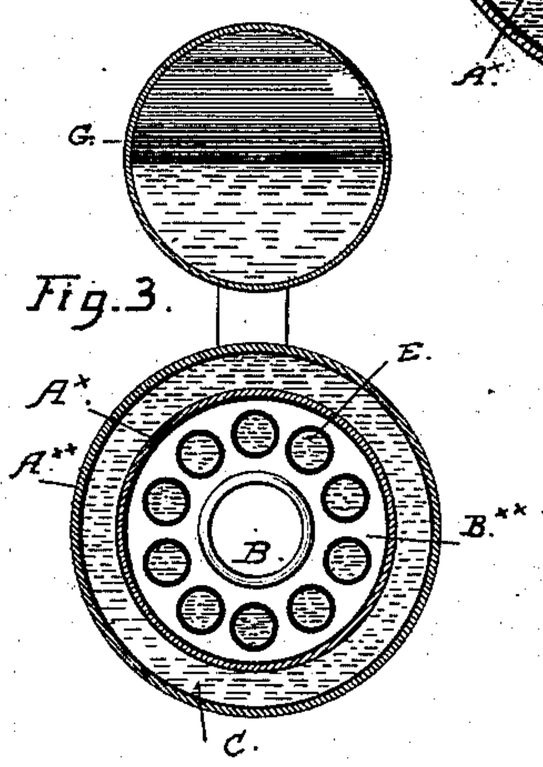


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

ELIAS H. THOMPSON, OF NEWARK, ASSIGNOR OF ONE-HALF TO E. J. CLARK AND J. B. WELCH, OF TULARE, AND CORNELIUS A. SHERMAN, OF LOS GATOS, CALIFORNIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 384,941, dated June 19, 1888.

Application filed October 14, 1887. Serial No. 252,400. (No model.)

To all whom it may concern:

Be it known that I, ELIAS H. THOMPSON, a citizen of the United States, residing at Newark, in the county of Alameda and State of California, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the drawings that form a part of this specification.

My invention relates to improvements in steam-generators or boilers in which liquid fuel—such as petroleum or gas—is burned; and it consists in certain improved construction of boiler or generator, consisting of an annular water-chamber with a tubular fire-flue extending through it from end to end, and water-tubes arranged in and around the fire-flue, as hereinafter fully described; also, in the combination, with each generator, of an inclosing-case with spaces and partitions for carrying and directing the heated air and gases from the end of the fire-flue in a circuitous manner around the outside of the generator, as hereinafter described.

The nature of these improvements and the manner in which I construct and carry out the same to produce a steam-boiler for burning liquid fuel or gas are explained in the following description, the accompanying drawings being referred to by figures and letters.

Figure 1 is a side elevation partly in longitudinal section. Fig. 2 is a cross-section at *x x*, Fig. 1. Fig. 3 is a cross-section at *y y*, Fig. 1. Fig. 4 is a cross-section through a boiler constructed according to my invention, with three fire-flues.

I form the body A of my improved boiler with an inner shell, $A^{\times}$, and an outer shell, $A^{\times\times}$, united at both ends by a double head, $B^{\times}$ $B^{\times\times}$, with a tubular opening and passage, the part whereof which lies between the shells $B^{\times}$ and $B^{\times\times}$ being inclosed by a thimble, B, there being also a pipe or connection, B^{2}, connecting the casting I with the thimble B. The outer shell is secured to the head $B^{\times}$ and the inner shell to the head $B^{\times\times}$. This construction produces an annular water-chamber, C, surrounding a tubular fire-flue, D, which extends through both ends of the boiler. Within this fire-space are water-tubes E E, arranged in a circle for the full length, with the ends of the tubes setting through the heads or flanges $B^{\times\times}$, and with fire-spaces between the tubes for circulation of heat and flames around them. At one end of the flue D, directly in front of the opening in one head, is placed a petroleum-burner of suitable capacity and power to inject and throw a flame through the fire-flue from end to end of the boiler. Any suitable petroleum-burner is used for the purpose with connection of a petroleum-tank and a steam-jet supplied from the boiler. Such connection is clearly shown in Fig. 1 of the drawings.

A steam-drum, G, is placed on the top of the boiler and connected in the usual manner with the steam and water space, the necessary steam-gages and safety-valve being provided on this part. I inclose these parts in a cast-iron casting, I, that surrounds them on all sides, but leaves space between its inside walls and the outer surfaces of the boiler and drum. This space is divided into passages K K by longitudinal partitions L L, that terminate at alternate ends just short of the head or end of the casing, as shown at W, Fig. 1, so that one passage communicates with the other, and the whole space forms a circuitous passage from the discharge end of the fire-space up to the outlet J at the top of the casing. The object of this casing is to utilize what heat and gases are discharged at the rear end of the boiler fire-space by carrying them around the outside of the generator, back and forth, before passing into the chimney. It will be obvious that these passages can be formed also in a brick-work setting, where such casing may be preferred, instead of the cast-iron case I.

In Fig. 4 I have illustrated as a modification a boiler having three fire-spaces extending through the water-space, with water-tubes in each. The construction is the same as that shown in Fig. 3 with respect to each fire-space.

I am aware that generators have been formed in which a grate is used with the double shells and double heads, and water-tubes connecting

the spaces at the ends arranged over the fire, and I do not claim such, as my invention possesses the advantage of utilizing the entire amount of heat generated, and has no waste spaces and no unheated parts in which it is difficult to heat the water.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a steam-generator, the combination of an outer shell, $A^{\times\times}$, and an inner shell, $A^{\times}$, the heads $B^{\times}$ and $B^{\times\times}$, extending inward past the shell $A^{\times}$, all around at each end thereof, and having the thimbles B, connecting the said heads, substantially as described, and the water-tubes E, placed in a circle all around the fire-flue and communicating at each end with the water-chamber between the shells $A^{\times}$ $A^{\times\times}$, as and for the purpose set forth.

2. In a steam-generator, the combination, with a cylindrical fire-flue contracted all around at both ends, a water-chamber surrounding said fire-flue on the sides and over a portion of the ends, and thimbles connecting the walls of the ends, of a series of water-tubes extending longitudinally through the said fire-flue on all sides thereof and communicating with the water-chamber at the ends, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

ELIAS H. THOMPSON. [L. S.]

Witnesses:
C. W. M. SMITH,
CHAS. E. KELLY.