T. P. FRANKE.

Steam Generator and Heater.

No. 211,901. Patented Feb. 4, 1879.

FIG. 1.

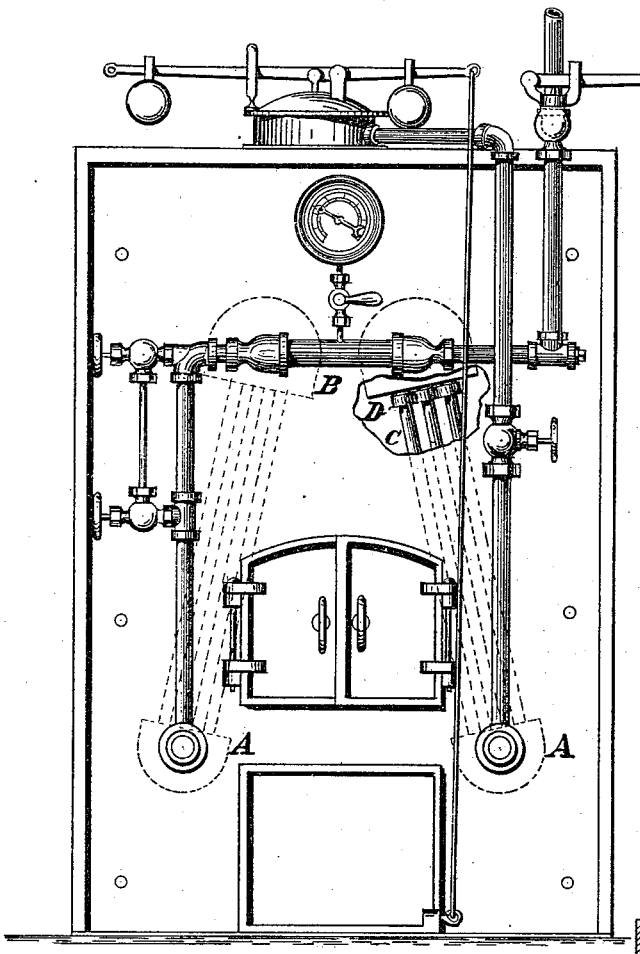
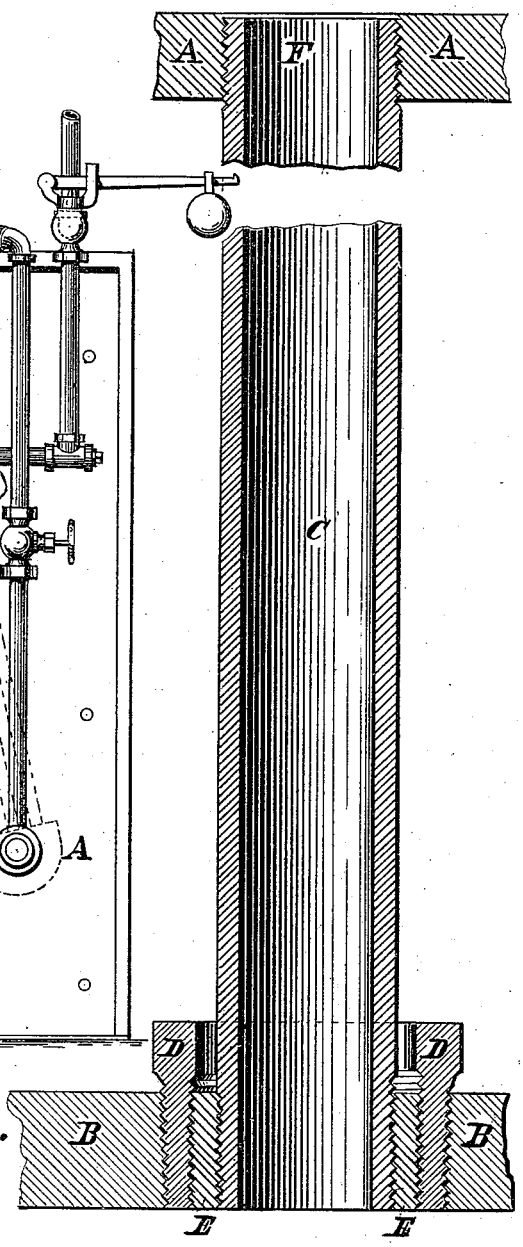


FIG. 2.



Witnesses:

Frank Hirsch

Fred'k A. Juergens

Inventor:

Thos. P. Franke,

by Michael J. Stark

Atty.

UNITED STATES PATENT OFFICE.

THEODORE P. FRANKE, OF BUFFALO, NEW YORK.

IMPROVEMENT IN STEAM-GENERATOR AND HEATER.

Specification forming part of Letters Patent No. **211,901**, dated February 4, 1879; application filed August 16, 1878.

To all whom it may concern:

Be it known that I, THEODORE P. FRANKE, of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements on a Steam Generator and Heater; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has special reference to steam-generators of the class in which a multiplicity of tubes are employed that contain the water in their interior; and it consists in the peculiar arrangement of parts and details of construction, as hereinafter first fully set forth and described, and then pointed out in the claims, said improvements being designed with special reference to the manner of fastening the vertical or slightly-inclined heating-tubes within the horizontal drums to enable their ready insertion and removal.

In the drawings heretofore mentioned, Figure 1 is a front elevation of a steam-generator for heating purposes. Fig. 2 is a longitudinal sectional elevation of one of the heating-tubes.

Like parts are designated by corresponding letters of reference in all the figures.

A are two horizontal tubes, serving the purpose of mud-drums. B are two steam and water drums, and C a series of heating-tubes connecting the mud with the steam and water drums. For these tubes C, I preferably select the wrought-iron lap-welded pipes of commerce, which, owing to their thickness as compared with the usual boiler-flues, are stronger and better adapted to a tubular boiler.

I secure these tubes in the drums in such a manner that the lower end of the tubes, which has a plain screw-threaded end, F, is simply screwed into screw-threaded apertures in said lower drums; but in the upper drums I secure them by means of a screw-fitting, D, which is internally and externally screw-threaded, as clearly shown in Fig. 2, said internal thread engaging with the external thread on the end of said tube, and the external thread with the internal thread in the flue-apertures in said upper drums. To increase the size of the upper end of the tube sufficiently to enable me to pass the fitting D over said tube, and still make connection therewith, I screw onto that end of said tubes an internally and externally screw-threaded bushing, E, whereby the desired object is readily and inexpensively attained. I may, however, swage that end of the tubes sufficiently to increase its diameter as desired.

In putting the several sections of which my boiler is composed together, I prefer to first insert the first and last heating-tubes by passing the increased ends of the tubes through the respective apertures in the drums, then screwing the opposite plain threaded end into the opposite drum, and finally screwing the fitting D over the said tube and into the said first-mentioned drum. I then proceed to insert the remaining tubes in the manner described.

In boilers constructed of heating-tubes and drums similar to the above, where the heating-tubes are expanded in the drums, there are various drawbacks, of which the following are some of the most predominating: First, the drums must be made of such a large diameter as to enable a mechanic to enter the same with the necessary tools for expanding the tubes, which large-sized drums require proportionately heavier material, and are in many cases objectionable where there is lack of space—as, for instance in low cellars, under sidewalks, &c.; second, if one of the expanded heating-tubes becomes leaky it must be cut to be removed, which, especially if happening in a boiler having three rows of tubes in a series, is very difficult to perform, and often requires the removal of a number of the sound surrounding tubes before the affected one can be reached; third, the expanding of the tubes can often be but very imperfectly accomplished, owing to the limited space within which it must be performed. These objections are entirely overcome in my boiler on account of the peculiar manner in which the tubes C are inserted and secured, thus enabling me to readily remove any number of tubes without cutting, or even in the slightest degree damaging them, and without causing any further ex-

pense than for the time consumed in removing and replacing these tubes.

It will be readily observed that the water in the boiler is contained within the tubes, and that the heat acts upon the exterior thereof, which gives better and larger spaces for combustion and renders the boiler stronger and more durable. Such a boiler, although more particularly designed for heating purposes, is adapted to all the various uses to which boilers are generally applied.

In placing the sections I prefer to have the fitting D on the upper ends of the tubes C, so as to remove the same as far as possible away from the direct action of the fire, which might have a tendency to oxidize the metal of said fittings, which are not in direct contact with the water in the boiler.

Having thus fully described my invention, I claim as new, and desire to secure to me by Letters Patent of the United States—

1. The method of securing the heating-tubes of a tubular boiler into the horizontal drums, which consists in first applying the fitting E, or its equivalent, to one end of the tubes, then placing the fitting D over the tubes, then passing the increased end into the proper drum, then entering the plain threaded end of said tubes into the opposite drum, and finally inserting the fitting D into the first-mentioned drum, substantially as and for the object specified.

2. A steam-boiler in which the heating-tubes C are supplied with the internally and externally screw-threaded fitting E on one end and with a plain thread, F, on the opposite end, said tubes being inserted into the drums as stated, and secured on the increased end by means of the fitting D, substantially in the manner as and for the object stated.

In testimony that I claim the foregoing as my invention I have hereto set my hand and affixed my seal in the presence of two subscribing witnesses.

THEO. P. FRANKE. [L. S.]

Attest:

MICHAEL J. STARK,

FRANK HIRSCH.