

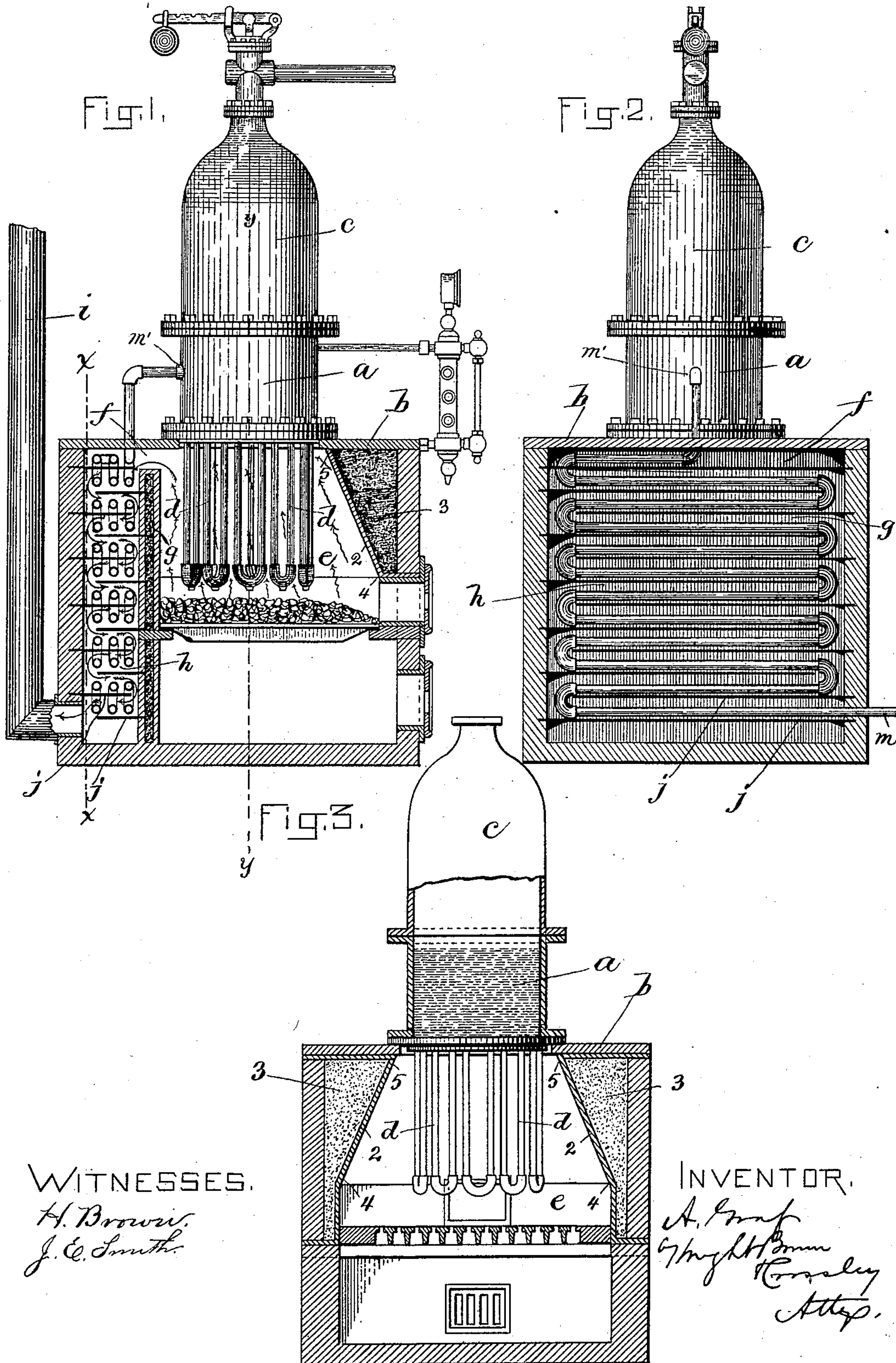
(No Model.)

A. GRAF.

FIRE BOX FOR STEAM GENERATORS.

No. 397,852.

Patented Feb. 12, 1889.





# UNITED STATES PATENT OFFICE.

ANTON GRAF, OF GEORGETOWN, ASSIGNOR OF TWO-THIRDS TO AUGUSTUS McDUFFEE AND ROSWELL CARLETON, BOTH OF HAVERHILL, MASSACHUSETTS.

## FIRE-BOX FOR STEAM-GENERATORS.

SPECIFICATION forming part of Letters Patent No. 397,852, dated February 12, 1889.

Application filed March 19, 1888. Serial No. 267,660. (No model.)

*To all whom it may concern:*

Be it known that I, ANTON GRAF, of Georgetown, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Fire-Boxes for Steam-Generators, of which the following is a specification.

This invention has for its object to provide an improved fire-box for steam-generators in which the heat from the furnace shall be utilized as fully as possible.

To this end my invention consists in the improvements, which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a vertical section of the fire-box and its flues and a side elevation of the boiler and its depending tubes. Fig. 2 represents a section on line *x x*, Fig. 1. Fig. 3 represents a section on line *y y*, Fig. 1.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents the water-drum of the generator, the same being bolted to a cap or cover, *b*, placed on the casing which forms the furnace.

*d d* represent a series of U-shaped pipes, which communicate at their ends with the water-drum and extend downwardly therefrom into the fire-box.

*c* represents the steam-dome, secured to the water-drum, as shown.

The fire-box *e* of the furnace communicates through an opening, *f*, above the bridge-wall *g*, with a descending flue, *h*, back of said wall, said flue communicating with the stack or chimney *i*. In the flue *h* is a series of baffle-plates, *j*, arranged to cause the products of combustion to pass down said flue in a sinuous course, as indicated by the arrows in Fig. 1.

*m* represents the feed-water-supply pipe, which extends, as shown in Figs. 1 and 2, back and forth over the baffle-plates *j*, said pipe being preferably arranged in two or more bends over each baffle-plate, as shown in Fig. 1, said pipe entering the water-drum at *m'*.

The feed-water is therefore heated on its way to the boiler by the waste heat and products of combustion.

The pipes *d*, extending downward from the water-drum into the fire-box, present a large area of surface to the fire, whereby the generation of steam is greatly facilitated.

The important part of my invention is the lining of the walls of the fire-box, including the bridge-wall, with fossil meal, which is an excellent non-conductor of heat, and therefore causes the heat to be utilized as fully as possible without loss by outward radiation. The walls of the fire-box, including the bridge-wall, are composed of hollow boxes (of any suitable metal) 2, filled with fossil meal, 3. I prefer to make the inner surfaces of the side and front walls thickest at their upper portions and inclined from 4 to 5, as shown in Figs. 1 and 3, for the double purpose of giving as large a grate area as possible and providing an increased thickness of the non-conducting material at the upper portion of the fire-box, where the heat is greatest.

It will be seen that the non-conducting material causes the heat to be concentrated on the pipes *d*, and constitutes an important adjunct of said pipes and the boiler in facilitating the generation of steam.

Fossil meal is extremely light in proportion to its bulk, so that a sufficient quantity for the fire-box for a ten-horse-power engine will not exceed five pounds. It is therefore a very desirable non-conducting material when lightness is an object, as in engines for yachts.

Fossil meal cannot be burned or melted at any degree of heat.

The entire arrangement is such as to secure compactness, the generator as a whole being, therefore, adapted for heating buildings or for stationary, marine, and locomotive engines.

I am aware that it is not new to use fossil meal as a non-conductor, and hence I do not make broad claim thereto.

I claim—

The fire-box having its walls thickened at their upper ends and inclined on their inner sides, and the non-conducting material—as

fossil meal—disposed within said walls, substantially as shown and described, whereby an increased thickness of the non-conducting material is obtained at the point where the  
5 heat is greatest, as set forth.

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

scribing witnesses, this 3d day of March, A. D. 1888.

ANTON GRAF.

Witnesses:

EDW. F. ADAMS,  
HENRY A. GREENOUGH.