

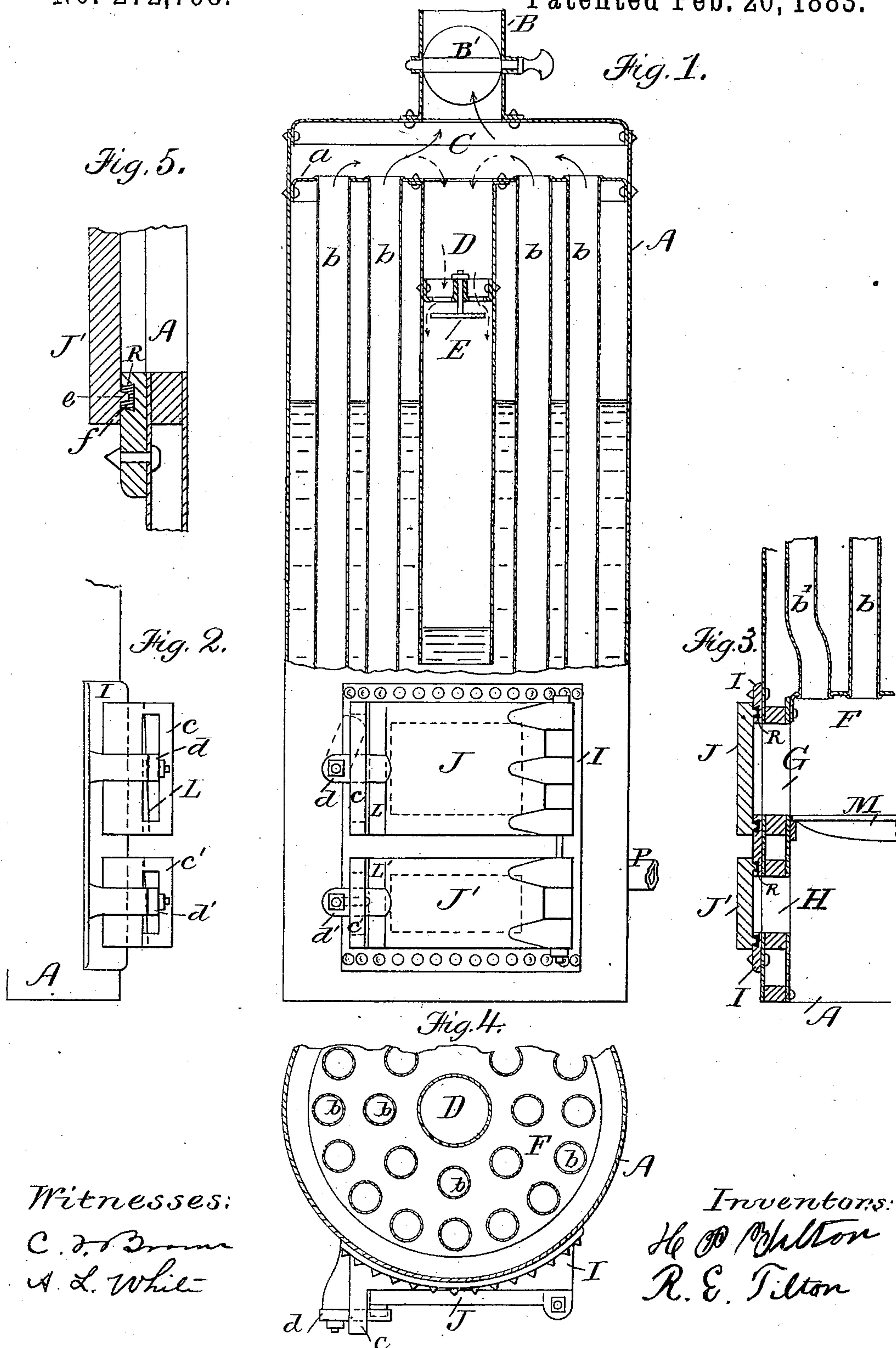
(No Model.)

H. P. & R. E. TILTON.

STEAM GENERATOR.

No. 272,798.

Patented Feb. 20, 1883.



N. PETERS, Photo-Lithographer, Washington, D. C.



# UNITED STATES PATENT OFFICE.

HUBERT P. TILTON, OF ALBION, MAINE, AND RUFUS E. TILTON, OF  
BROCKTON, MASSACHUSETTS.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 272,793, dated February 20, 1883.

Application filed October 9, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, HUBERT P. TILTON, of Albion, county of Kennebec, and State of Maine, and RUFUS E. TILTON, of Brockton, in the county of Plymouth and State of Massachusetts, have invented certain Improvements in Steam-Generators, of which the following is a specification.

This invention has for its object to provide an improved steam-generator adapted to utilize, in the generation of steam, all the heat resulting from the combustion of the fuel employed.

To this end the invention consists in a steam-generator comprising a fire-box, a boiler, flues, or passages, whereby all the heated air and products of combustion from the fire-box are caused to pass directly through and in contact with the water in the boiler, combined with air-forcing apparatus, whereby said heated air and products of combustion are forced into and through the water in the boiler.

The invention also consists in certain details, all of which we will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation and partial vertical section of a steam-generator embodying our invention. Figs. 2, 3, 4, and 5 represent details of construction.

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

In the drawings, A represents a boiler of suitable construction, arranged over a furnace or fire-box, F.

b b represent vertical flues extending from the fire-box through the boiler to a chamber, C, located above the boiler, said flues constituting the only means for the passage of heated air and products of combustion from the fire-box.

D represents a flue extending downwardly from the chamber C, and opening into the lower portion of the boiler below the water-line, said flue being adapted to conduct the heated air and products of combustion from the chamber C and discharge the same into the water in the boiler.

P represents a pipe, which enters the ash-pit

of the fire-box, and is connected to a blower or other suitable air-forcing apparatus, which it is not deemed necessary to represent in the drawings; any apparatus capable of forcing air into the fire-box at a pressure in excess of that of the steam generated in the boiler being suitable.

B represents a smoke-stack or chimney leading from the chamber C, and provided with a tightly-closing valve or damper, B', of any suitable construction.

E represents a check-valve in the flue D, adapted to prevent the water in the boiler from rising in said flue.

The general operation of our improved generator is as follows: When the fire is first kindled in the fire-box, the valve B' in the stack B is opened, so that the products of combustion escape through the stack. When the fire is thoroughly kindled, the valve B' is closed, and air under a suitable degree of pressure is forced by means of the pipe P and connected apparatus upwardly through the fire-box, becoming heated therein, and passing, with the products of combustion, upwardly through the flues b into the chamber C, downwardly through the flue D into the water in the boiler, and upwardly through and in direct contact with the water to the steam-space, the heated air and gases mingling with the steam and passing with it to the engine. It will be observed that the heat developed in the fire-box is thus utilized to the highest possible degree. The water in the boiler arrests the cinders and other solid products of combustion, so that none of such products will pass to the engine.

The accumulations of solid matter in the boiler can be removed by blowing out the water as frequently as may be required.

In case the pressure of the air supplied to the fire-box should cease or fall below the steam-pressure, the valve E prevents the water in the boiler from being forced into the fire-box through the flue D, chamber C, and flues b.

The fire-box and ash-pit should be as nearly air-tight in their construction as possible, and to this end we provide the door frame or seat I with rectangular grooves R, partially filled with packings, f, of asbestos, in which packings are formed grooves, which receive flanges e, pro-

jecting from the doors J J'. The seat I and inner surfaces of the doors are preferably ground, so as to insure a close fit. On the outer surfaces of said doors are projections L L', inclined outwardly from the upper to the lower portion of each door.

*d d'* represent short levers pivoted to the door-frame, and adapted to swing vertically in slotted projections *c c'*. When the levers *d d'* are raised, as shown in dotted lines in Fig. 1, they release their respective doors; but when they are swung downwardly they bear against the inclines L L', and, being supported from without by the slotted projections *c c'*, they press the doors inwardly with a degree of force proportioned to the extent of their downward movement.

We claim—

1. The combination, with the fire-box F, flues *b*, and upper chamber, C, and boiler, of a flue, D, substantially as described, whereby the products of combustion, after leaving the fire-box, circulating about the water in the boiler, and passing through flue *b* and chamber C, are con-

ducted downwardly through flue D and the water in the boiler, for the purpose set forth.

2. The combination, with fire-box F and fans for blowing same, the flues *b*, upper chamber, C, smoke-stack B, valve B', and flue D, of horizontally-arranged valve E, substantially as described, whereby when the pressure of steam exceeds that of the combustible material the former is prevented from being forced into the fire-box, as described.

In testimony whereof we have signed our names to this specification, each in the presence of two subscribing witnesses.

HUBERT P. TILTON.  
RUFUS E. TILTON.

Witnesses to H. P. T.:

CHAS. W. TILTON,  
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Witnesses to R. E. T.:

CHAS. W. SUMNER,  
GEO. L. TILTON.