

D. Matthew,

Steam-Boiler Water-Tube.

N^o 18,822.

Patented Dec. 8, 1857.

Fig. 2.

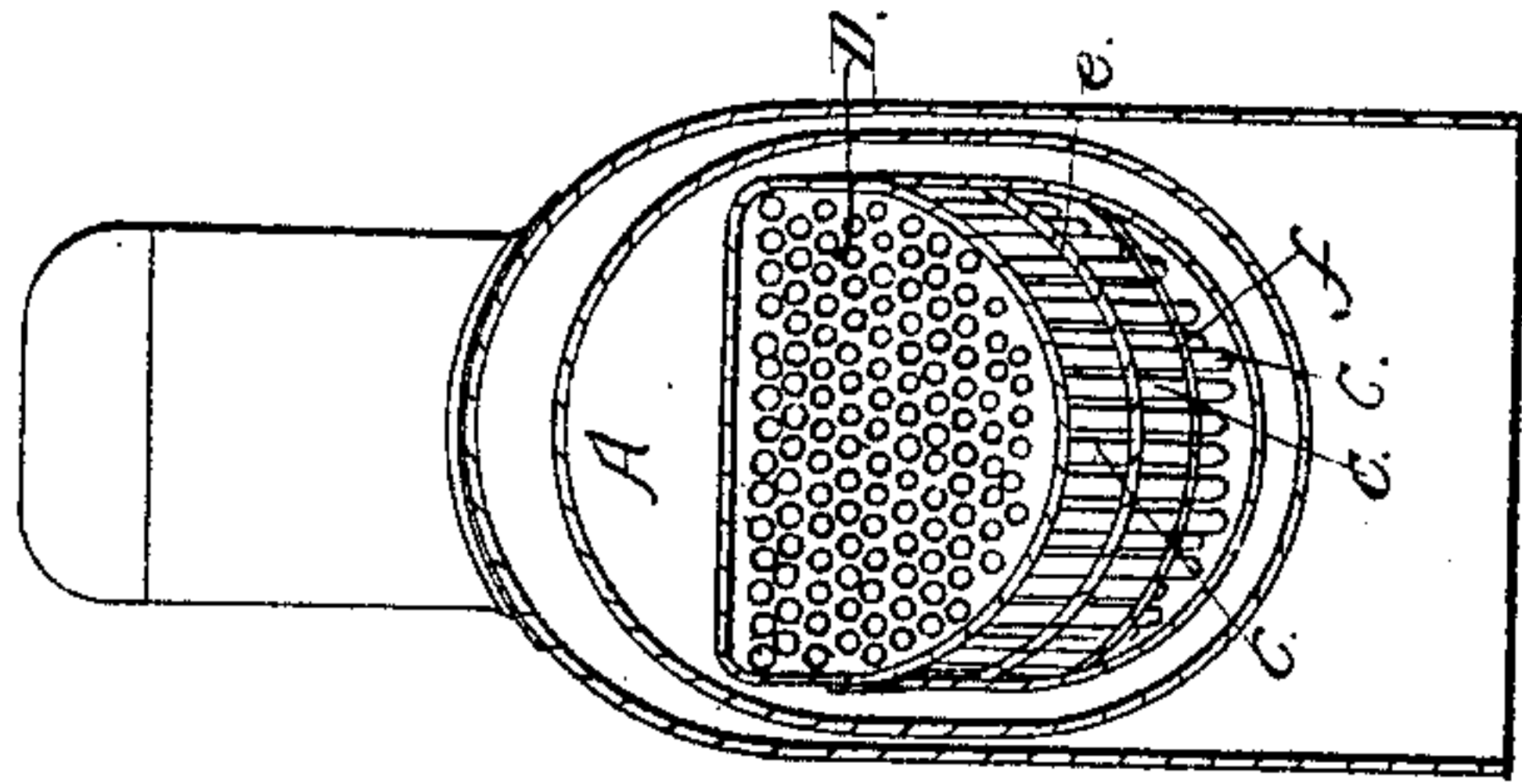


Fig. 1.

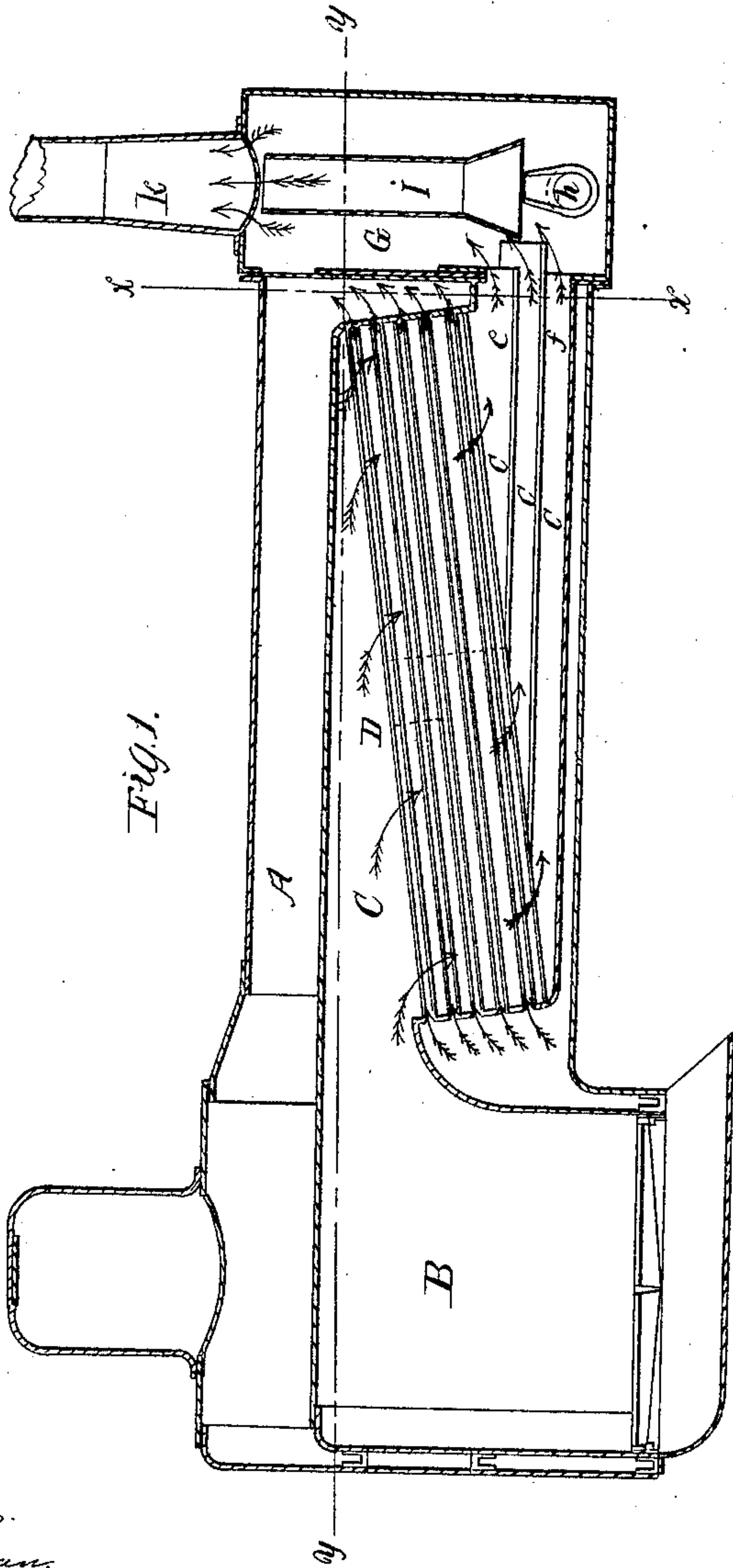
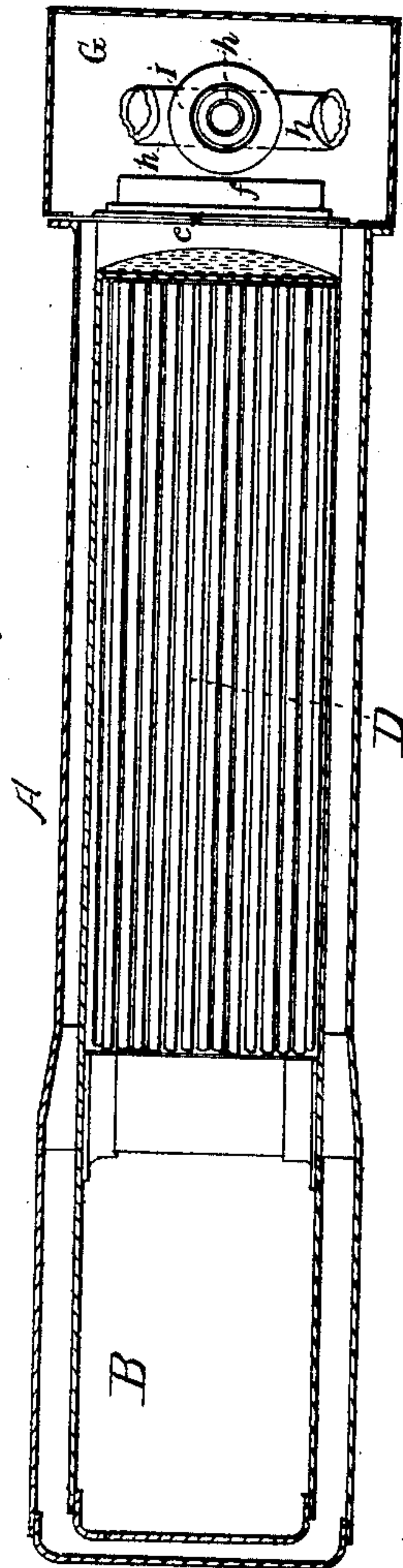


Fig. 3.



Inventor.

David Matthew.

Witnesses.
Wm. B. Freeman,
Charles D. Freeman.

UNITED STATES PATENT OFFICE.

DAVID MATTHEW, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-BOILER.

Specification of Letters Patent No. 18,822, dated December 8, 1857.

To all whom it may concern:

Be it known that I, DAVID MATTHEW, of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the letters of reference marked thereon.

The nature of my invention consists in a certain improvement in the arranging of the combustion chamber, and flue tubes for the better combustion of the gases, also the better protection of the flue tubes and boiler surfaces from soot and luminous or products of combustion.

To enable others skilled in the art to make and use my invention, I shall proceed to describe its construction and operation, reference being had to the accompanying drawings forming part of this specification, in which similar letters in the different figures, indicate like parts, and in which—

Figure 1 is a side elevation shown in section. Fig. 2 is a vertical section at $x x$ Fig. 1. Fig. 3 is a transverse section at right angles to section Fig. 2; at $y y$ Fig. 1.

A'' is the boiler shell, B'' the furnace, C'' the combustion chamber, D'' the flue tubes, c'' c'' c'' the lower combustion chamber, G'' the smoke box.

e'' f'' are draft plates in chamber c'' c'' c''.

h'' is the exhaust pipe, I'' is draft pipe or sectional chimney, K'' is the chimney or upper section above the smoke box and boiler.

It is a well-known fact that in steam boilers where vertical or horizontal flue tubes are used to generate steam by the application of the heat outside and the water inside of the tube, that they are from the eddies, and want of rapid current of air, or the gases, through among all parts of the tubes, to accumulate deposits of soot, luminous or other products of combustion to them to the entire destruction of their heating properties.

To obviate the injurious effects resulting from the fouling of the flue tubes, and combustion chamber, I so graduate the space between the flue tubes, so as to make the current of sufficient strength through the combustion chamber, and among the flue tubes, so as to prevent any deposit of soot, lumi-

nous or other products of combustion to adhere to them; also by means of the draft plates, make the current uniform through the whole length of the flue tubes and combustion chamber. I so graduate the size or area of the combustion chamber and the space between the flue tubes, so that their area shall be such as to give the necessary velocity to the current of gases, &c., to prevent the deposit of the nonconducting substances, which adheres to the heating surfaces in eddies, and sluggish currents, rendering them useless. If there is any disproportion, let it be in favor of draft and cleanliness. To do this I construct a boiler A'', of the usual form of shell, and furnace B'', with combustion chamber C'', running through the whole length of waist, having flue tube sheet, so as to have the flue tubes running diagonally from bottom to top (see Fig. 1, D), thus forming by means of the tubes an upper and lower chamber for gases, while the water has regular ascending current or circulation, while the fire and gases are drawn with great rapidity by the exhaust steam and draft pipe into the smoke box, through among the flue tubes in its passage from furnace to the smoke box, and the draft or current is made to be equally divided the whole length of tubes and combustion chamber by the draft sheets e and f, in its passage to the smoke box and draft pipe, or sectional chimney in smoke box. The direction of the current is shown in Fig. 1 by the arrows, also the circulation of water in flue tubes.

I am well aware that steam boilers are constructed with chambers through them, and vertical tubes arranged for passage of water through their inside, and the passage of the heat and gases through among them horizontally; also for the chambers to be filled with horizontal tubes, with the heat and gases passing horizontally among them; also horizontal tubes with curves or bent up ends, over the grate surface in the furnace, with the heat and gases rising up among them and passing off in a horizontal direction to the other end of them, thus filling the whole space of the chamber for the purpose of increasing the heating or tube surface, but without any such effects as mine and I do not wish to be mistaken as using a mere

modification of such an arrangement of tubes and chamber or as claiming any such arrangement or device.

What I claim as my invention, and desire
5 to secure by Letters Patent, is—

The arrangement of the draft plates *e*
and *f*, in relation to the inclined tubes or

flues *D*, as and for the purposes herein set forth.

DAVID MATTHEW.

Witnesses:

CHARLES D. FREEMAN,
WESLEY BRAINERD.