

(No Model.)

D. P. FERRO CARDOZO.
STEAM BOILER.

No. 575,881.

Patented Jan. 26, 1897.

Fig. 1.

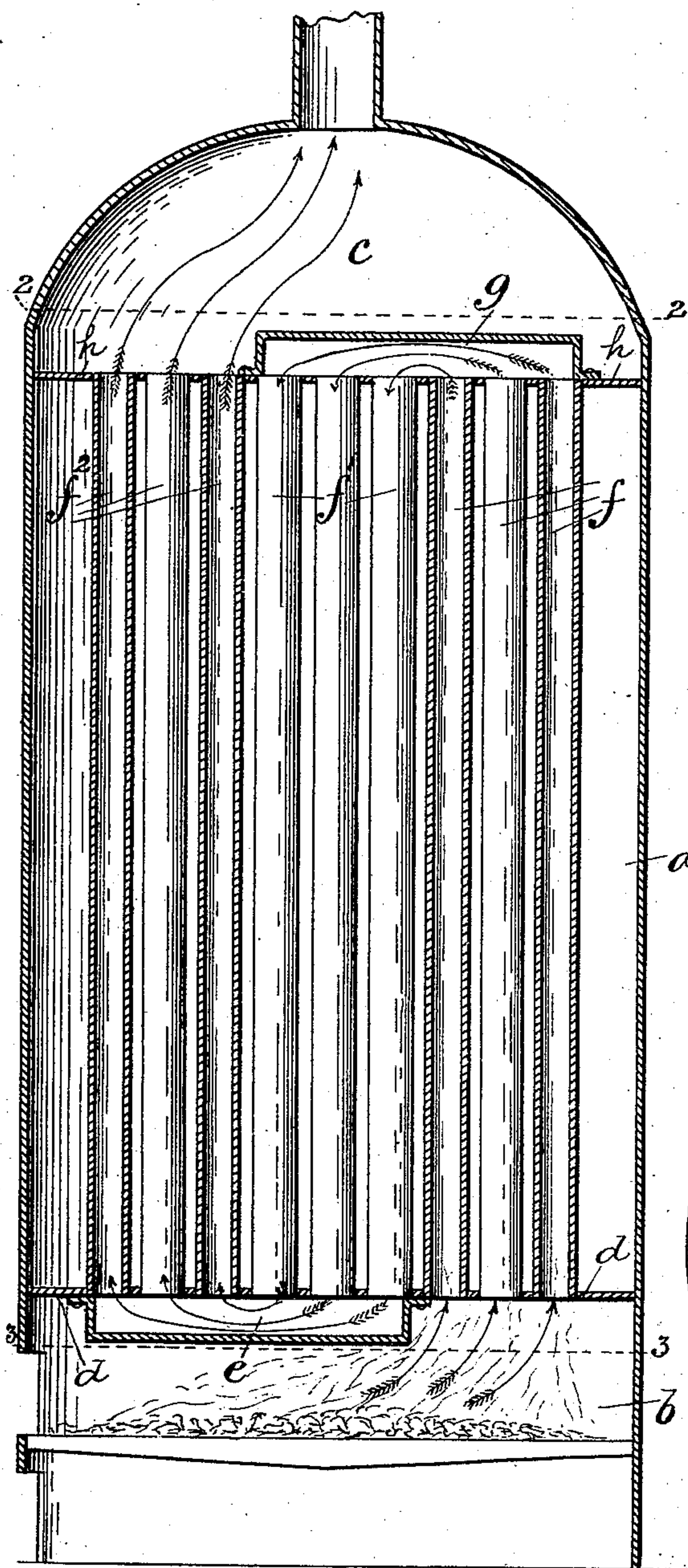


Fig. 2.

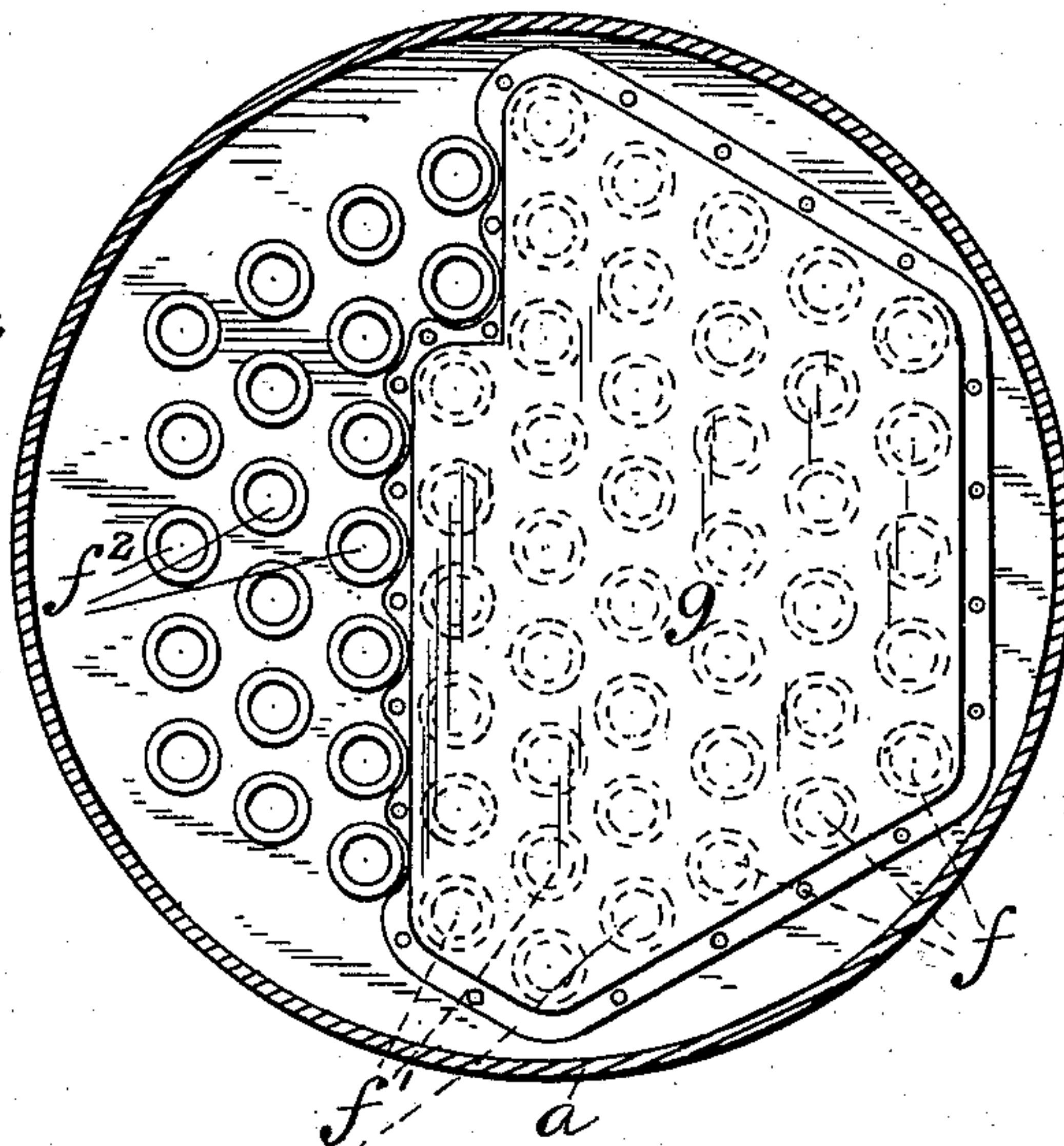
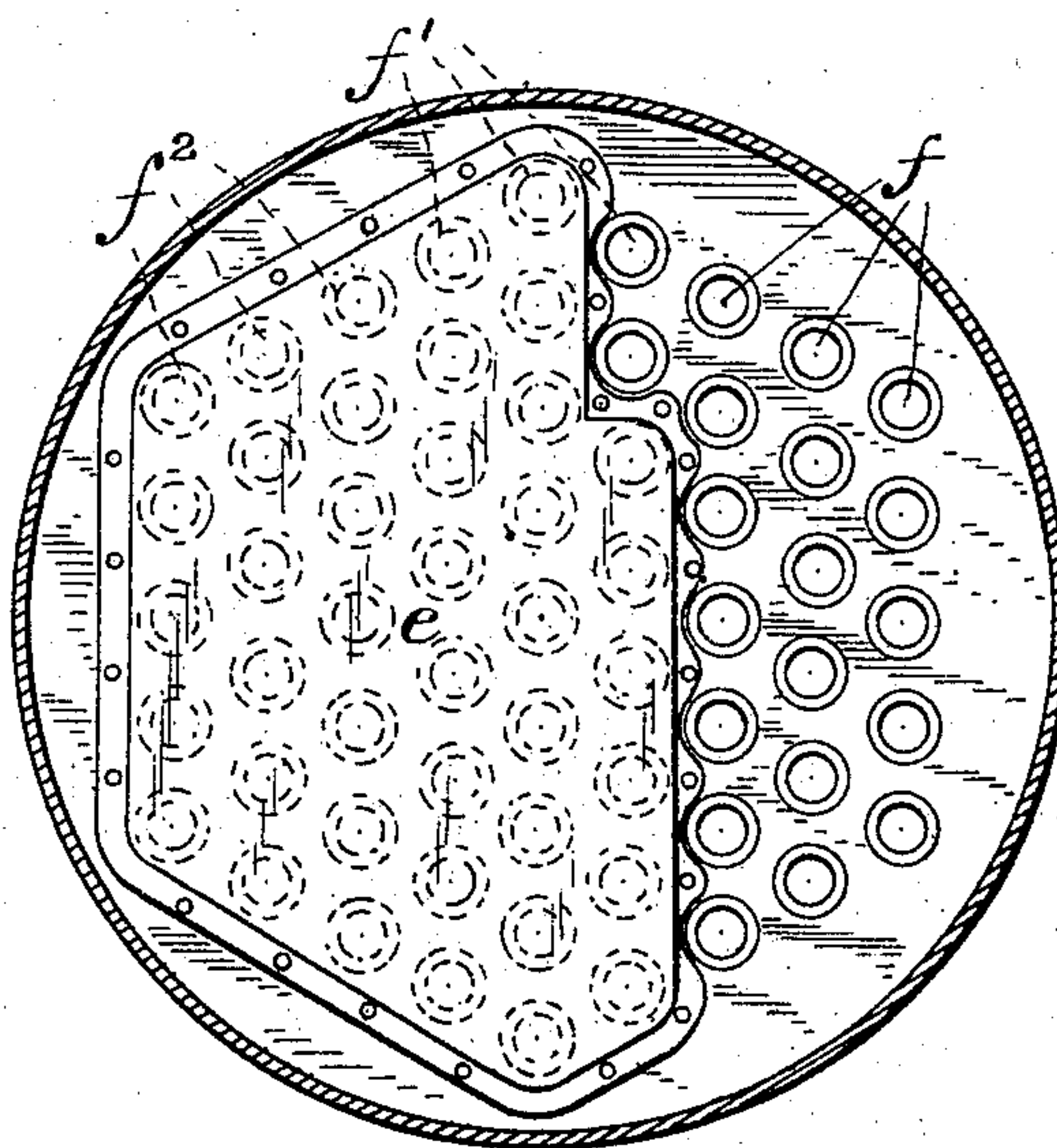


Fig. 3.



Witnesses

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Inventor

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UNITED STATES PATENT OFFICE.

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STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 575,881, dated January 26, 1897.

Application filed June 19, 1895. Serial No. 553,329. (No model.)

To all whom it may concern:

Be it known that I, DANIEL P. FERRO CARDOZO, a citizen of the Republic of Brazil, at present residing in the city, county, and State of New York, have invented certain new and useful Improvements in Vertical Tubular Steam-Boilers, of which the following is a specification.

Heretofore it has been proposed in a tubular boiler to divide the tubes into sections or groups by means of end caps and cause the products of combustion to pass through the several sections in series. My present invention is based upon the same general principle of construction and operation, but embodies new features, which consist in so constructing a vertical tubular boiler that the end cap or box connecting two sections of the tubes at the bottom shall form the roof of the fire-box and that the similar cap connecting sections of tubes at the top shall be inclosed by the dome to which the chimney or uptake for the products of combustion is connected. In such a construction there is a minimum loss of temperature by radiation and a more efficient utilization of the heat of the products of combustion than if the caps or boxes were exposed to the atmosphere.

The accompanying drawings show the application of my improvements to a vertical tubular boiler.

Figure 1 is a central vertical section of the same. Fig. 2 is a horizontal plan section taken on the line 2 2; and Fig. 3 is a horizontal section on the line 3 3, looking toward the tubes.

The body *a*, fire-box or furnace *b*, hood *c*, the tubes and tube-heads are of the ordinary construction.

To the tube-head *d* at the furnace end of the boiler is secured the box or cover *e*, forming the roof of the forward part of the fire-box and arranged, as shown at Fig. 3, to cover two-thirds of the tubes, leaving only the tubes *f f* exposed to the furnace for the products of combustion to pass therefrom. A similarly-formed box or cover *g* is secured to the tube-head *h*, also arranged to cover two-thirds of the tubes, one moiety of which

is the tubes *f f*, which are left exposed to the fire, and the other moiety *f' f'* being covered at their other ends by the box *e*. The tubes *f² f²*, which are exposed at the upper ends to the flue, are covered at the lower ends by the box *e*. The dome *c* completely incloses the box *g*. The tubes are thus divided into three sections *f f*, *f' f'*, and *f² f²*. The first section of tubes *f f*, or that section through which the gases from the furnace first pass, are connected at their upper ends, through the medium of the box *g*, to the upper ends of the section of tubes *f' f'*, and the lower ends of these tubes *f' f'* are, through the medium of the box *e*, connected to the lower ends of the section of tubes *f² f²*, that is to say, the boxes *g* and *e* form communicating passages between the sections *f f* and *f' f'* and the sections *f' f'* and *f² f²* of the tubes, respectively, the indicating-arrows showing clearly the path or direction of the products of combustion from the furnace *b* to the hood *c* and the flue extending from said hood.

It is evident that other arrangements of the gas-directing boxes may be made and the tubes of the boiler be divided into more than three sections; also that the number of tubes in each section may be varied. So I do not wish to limit my invention to the exact construction here shown.

What I claim as my invention is—

In a vertical tubular boiler, the combination with the dome, fire-box, and interposed tubes and tube-heads, of boxes respectively attached to the tube-heads, and formed to cover some of the tubes to act as a communicating passage between them, the exposed or uncovered tubes at either end of the boiler being part of those covered by the box at the other end, the box at the lower or furnace ends of the tubes forming a roof for the fire-box and the box at the upper ends of the tubes being inclosed by the dome.

In testimony whereof I have hereunto subscribed my name.

DANIEL P. FERRO CARDOZO.

Witnesses:

EDWARD C. DAVIDSON,
FRANK S. OBER.