

(No Model.)

D. RENSHAW.
FIRE TUBE STEAM BOILER.

No. 258,675.

Patented May 30, 1882.

FIG. 1.

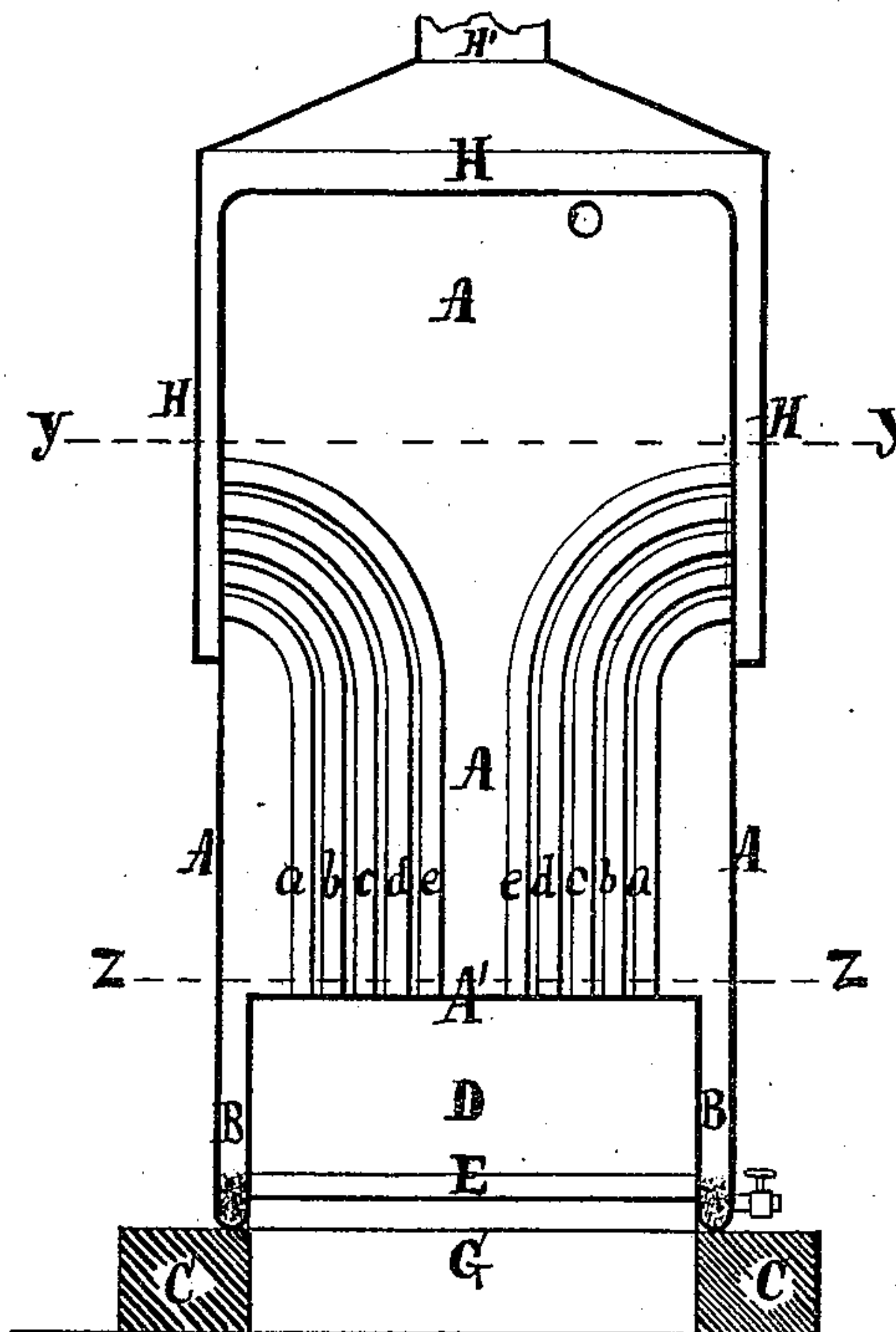


FIG. 2.

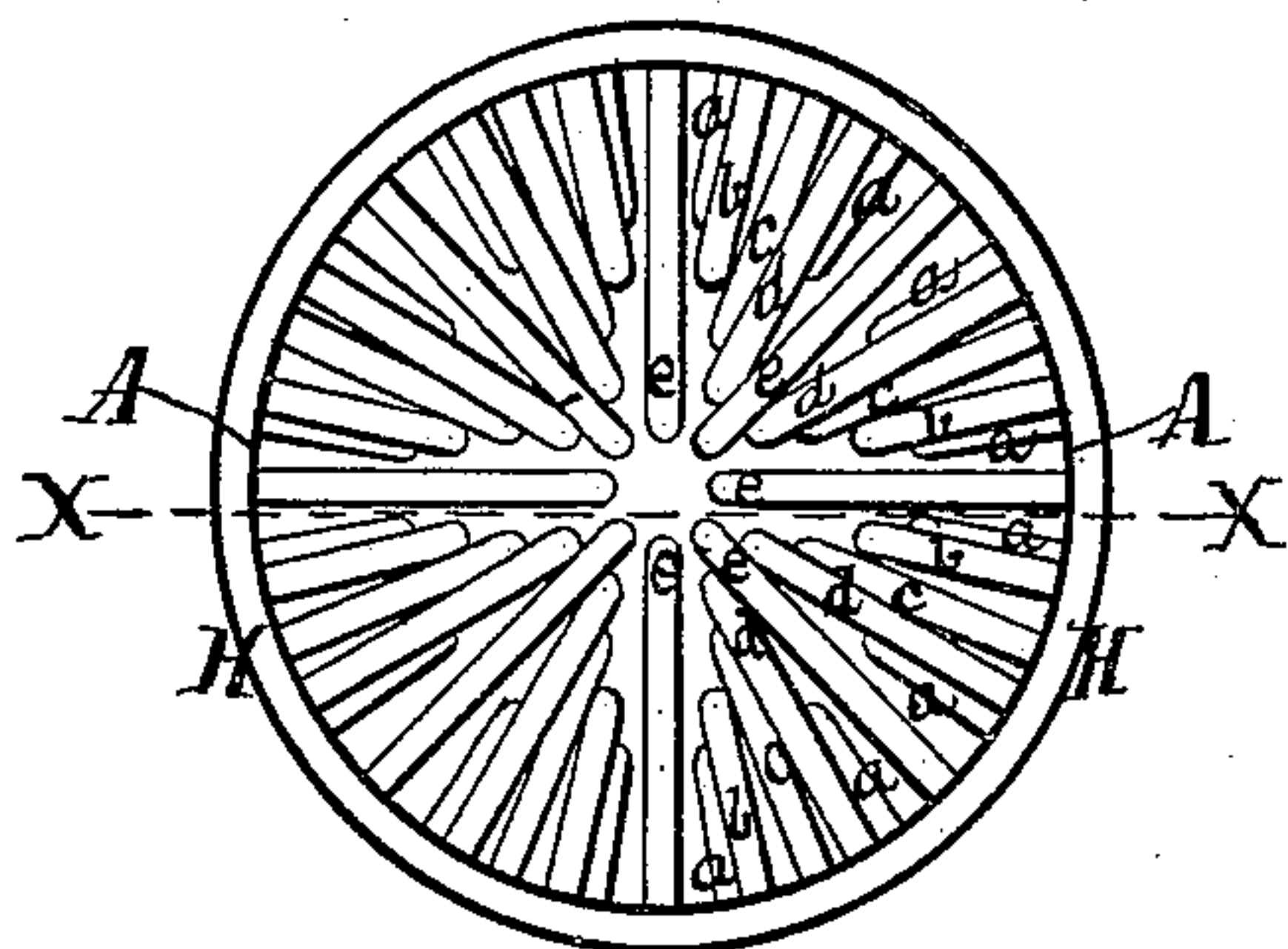
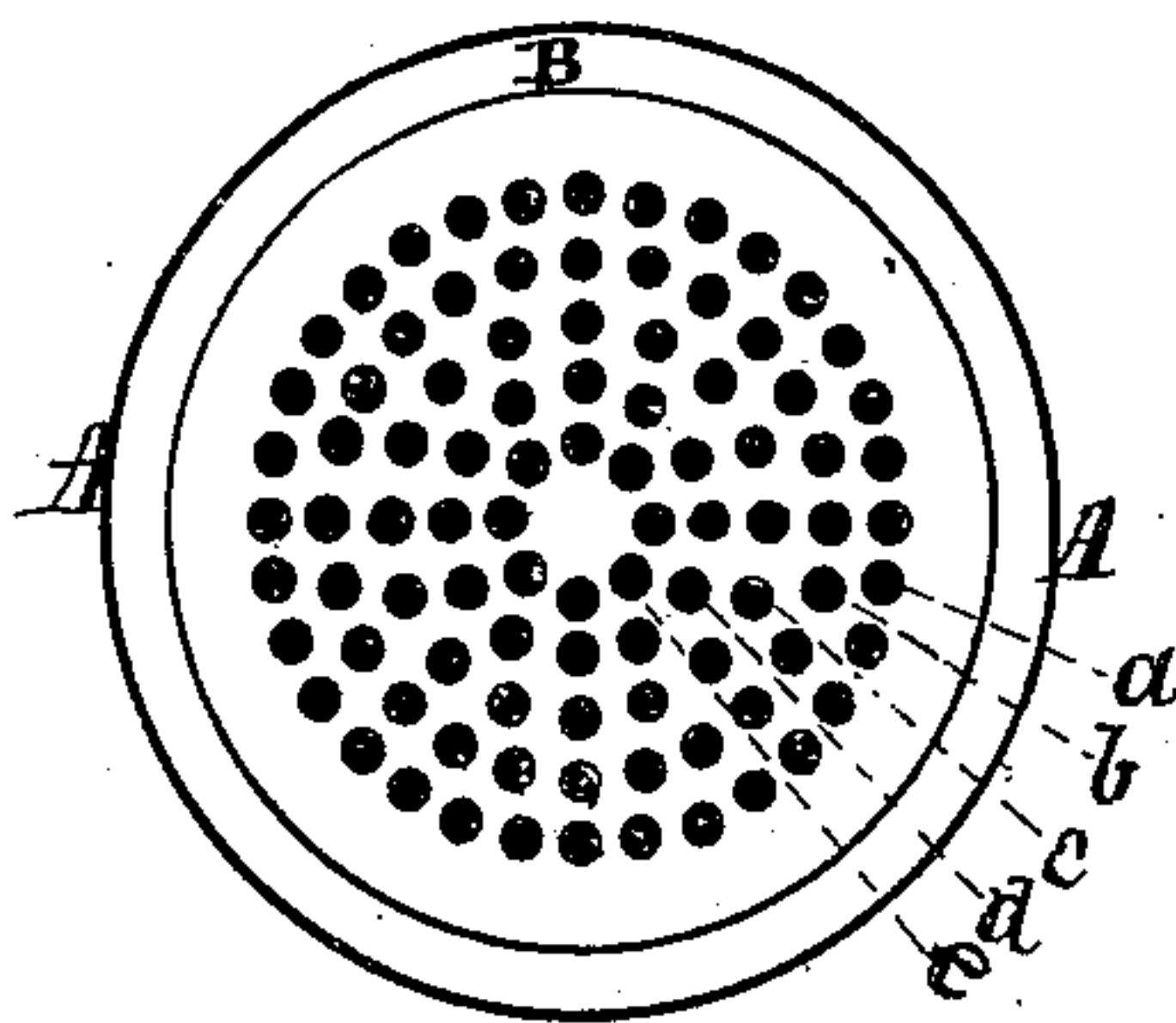


FIG. 3.



Witnesses.

Horace G. Tucker
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UNITED STATES PATENT OFFICE.

DAVID RENSHAW, OF COHASSET, ASSIGNOR OF ONE-HALF TO HARVEY T. LITCHFIELD, OF HULL, MASSACHUSETTS.

FIRE-TUBE STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 258,675, dated May 30, 1882.

Application filed December 1, 1880. (No model.)

To all whom it may concern:

Be it known that I, DAVID RENSHAW, a citizen of the United States, residing at Cohasset, in the county of Norfolk and State of Massachusetts, have invented a new and useful Fire-Tube Steam-Boiler, of which the following is a specification.

The object of my invention is to improve upon the present construction of steam-boilers of the vertical type; and before proceeding to describe my invention in detail I will remark that it is generally understood, as a rule, that the particles of foreign matter entering with the feed-water are small. The steam generated beneath them in common boilers balloons them to the surface of the water, where the steam will be liberated. The heavier particles will descend, and the impalpable particles by their subsidence upon the boiler-plate concrete into scale. The effect of this incrustation on the heating surface is that in proportion to the amount of solid matter accumulated, combined with its non-conductive property, so will the evaporation be retarded. As before stated, the incrustation formed by the water commonly used is almost a non-conductor of heat, the soluble matter held in suspension is precipitated to the surface of the boiler plate or flue. Thus pitting, burning, and oxidation of the boiler-plate are the result. Now, with my construction of fire-tubes, nearly occupying the whole surface of the crown-sheet and radiating through the body of the water in the boiler, producing such rapid circulation and velocity of the water in the boiler that it brushes and keeps clean the internal surface, the water in its rapid passage carries off the calcareous matter into the water-legs, where it is occasionally blown off. Thus the accumulation of calcareous deposit on the inner surface of the flues and upper sheets is entirely avoided.

While I am confident that by my arrangement of bent tubes I provide for the expansion and contraction with much better effect than has heretofore been accomplished in this type of boiler, still, in view of what has been done, I claim no advantage in that particular; but the advantage I do claim in connection with these bent tubes is that by my improved hood, I limit the area of exit in such a manner as to

retain the products of combustion or heat in the tubes, and in contact with the heating-surface of the boiler to such an extent that the conduction of heat to the water is complete without interfering with the draft of the furnace.

While it may be considered as no part proper of this specification, I may be allowed to state that it was only through a long and costly series of experiments that I have discovered the following result: That in the proper and economic construction of a vertical boiler the area of exit should never exceed one-eighth of the area of the grate; but in regular boiler-building practice, in order to get the required heating-surface, it is usual to have an area of exit so large as to be destructive of economy in the use of fuel, such area of exit being usually one-quarter the area of the grate, and seldom, if ever, less than one-fifth, out of which grew the present invention. I do not therefore claim broadly all the features of this boiler, only those in combination that produce the described result.

Figure 1 represents a vertical longitudinal section of my boiler and hood. Fig. 2 is a plan or horizontal view taken on the line Y Y just above the nests of fire-tubes; and Fig. 3 shows a horizontal section taken on the line Z Z, Fig. 1.

The line X X, Fig. 2, shows how the tubes are located—that is, what may be termed “break joints”—so that when a tube should happen to leak it may be removed without interfering with the other tubes.

A represents the water and steam space; B, the water-legs; C, the foundation; D, the combustion-chamber; E, the grate-bars; H, the hood, which extends and encircles nearly one-half the outer shell of the boiler; H', the uptake or chimney; G, the ash-pit, and *a b c d e* the fire-tubes.

The usual appliances—such as blow-off, safety-valve, gages, &c.—are not shown.

Thus it will be seen I have produced a stationary steam-generator at once cheap and simple in construction, a thorough and rapid steamer, getting the greatest heat out of the least fuel. The boiler is almost a self-cleaner, and the hood a superheater. It is durable and safe. The mud and sediment accumulating in

the water-legs, which extend below the grate or heating surface, are readily blown off. Thus I combine safety with economy.

5 I am aware that boilers have been constructed approximately like mine, (reference being had to Patent No. 90,083,) and do not therefore claim any of the features separately; therefore

10 What I claim as new, and desire to secure by Letters Patent, is—

In a vertical steam-generator, the group of bent tubes extending from the crown-sheet to

and through the entire body of water and approaching all sides of the shell, in combination with a hood constructed in such manner that 15 the space between the hood and the shell of the boiler is less in area than the combined area of all the tubes, for the purpose set forth and described.

DAVID RENSHAW.

Witnesses:

CHAS. F. SLEEPER,
EDWARD LALLY.