

(No Model.)

2 Sheets—Sheet 1.

F. W. DEAN.
STEAM BOILER.

No. 565,106.

Patented Aug. 4, 1896.

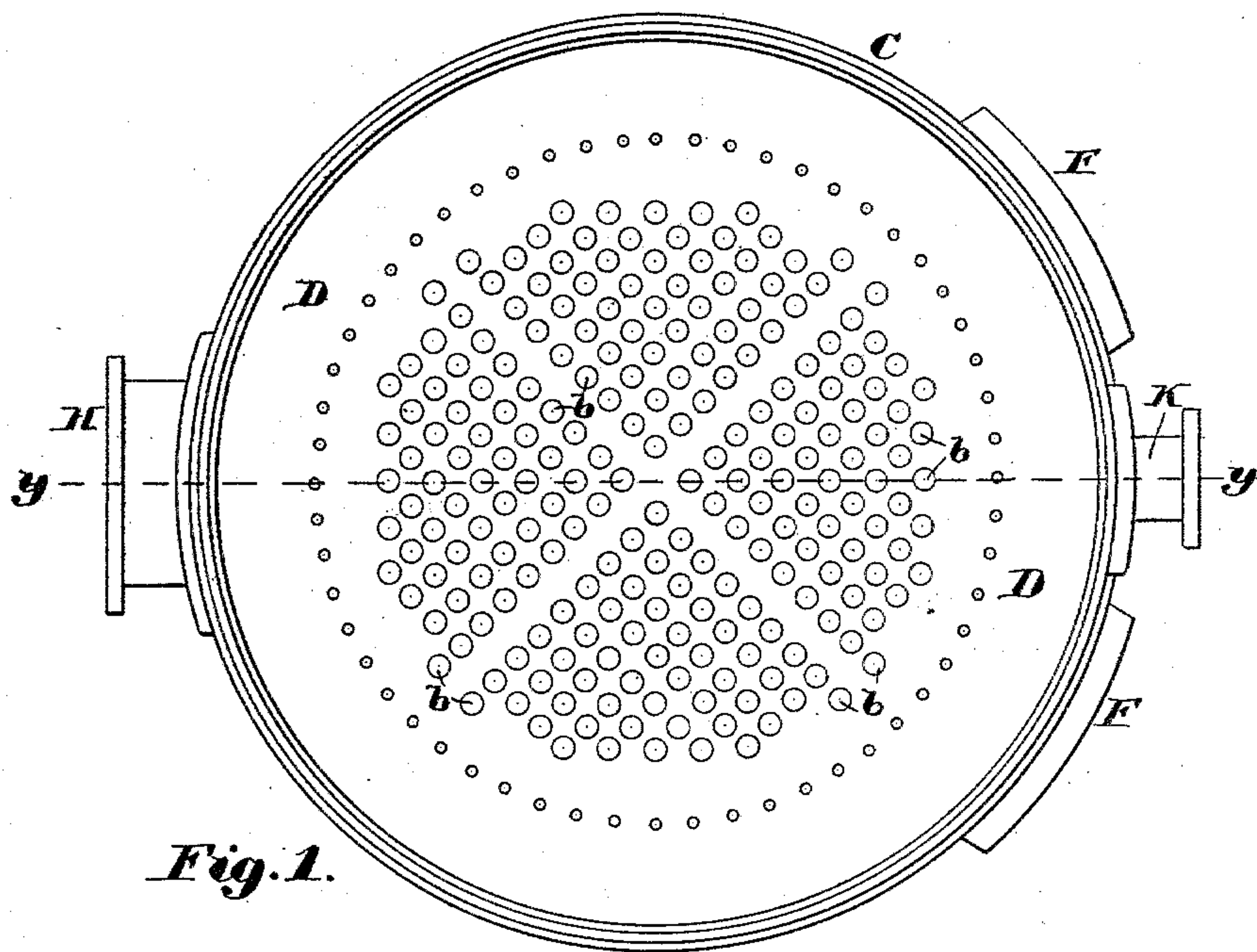


Fig. 1.

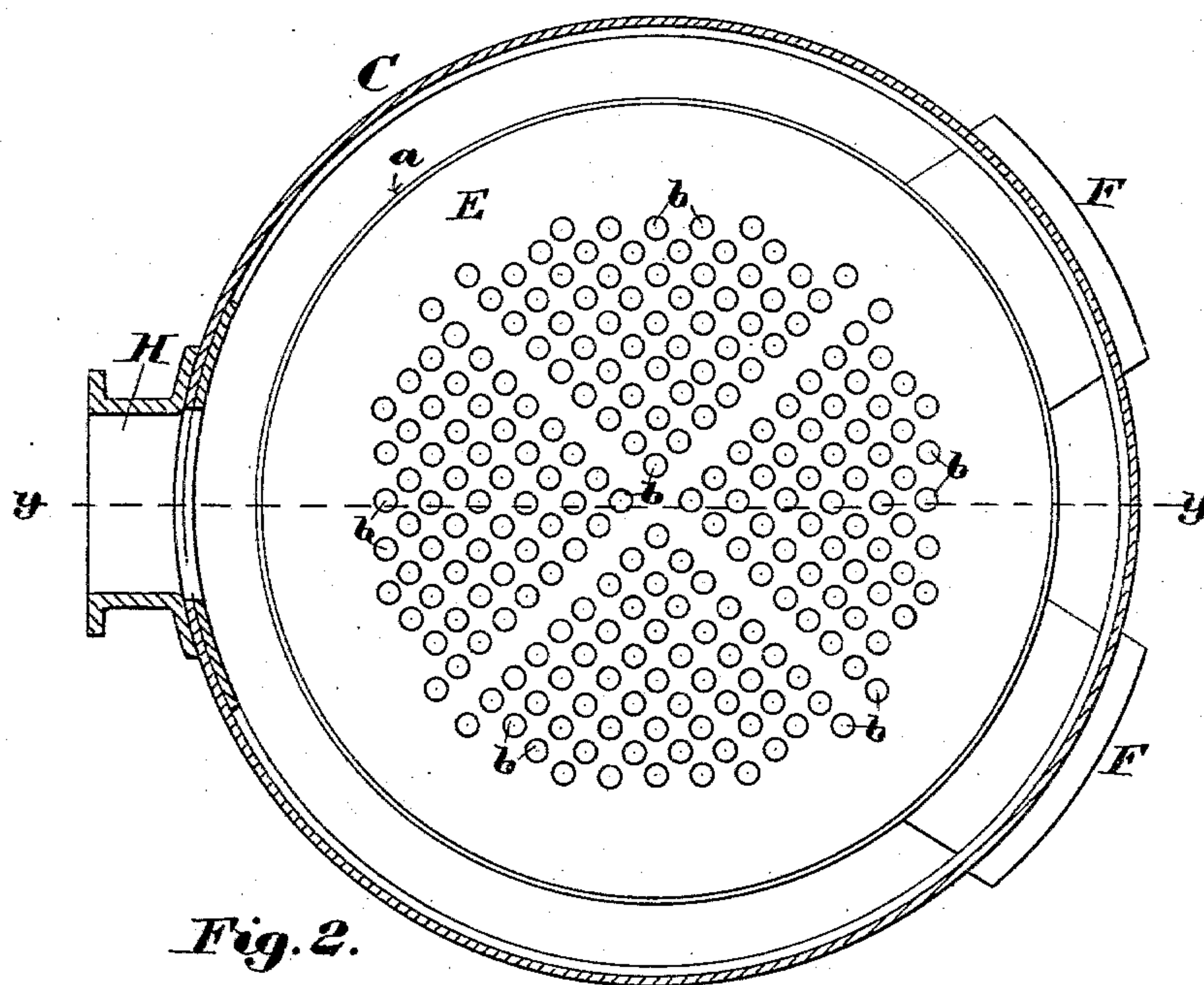


Fig. 2.

Witnesses:
Walter E. Lombard
George H. Brown

Inventor:
Francis W. Dean,
by N. C. Lombard
Atty.

(No Model.)

2 Sheets—Sheet 2.

F. W. DEAN.
STEAM BOILER.

No. 565,106.

Patented Aug. 4, 1896.

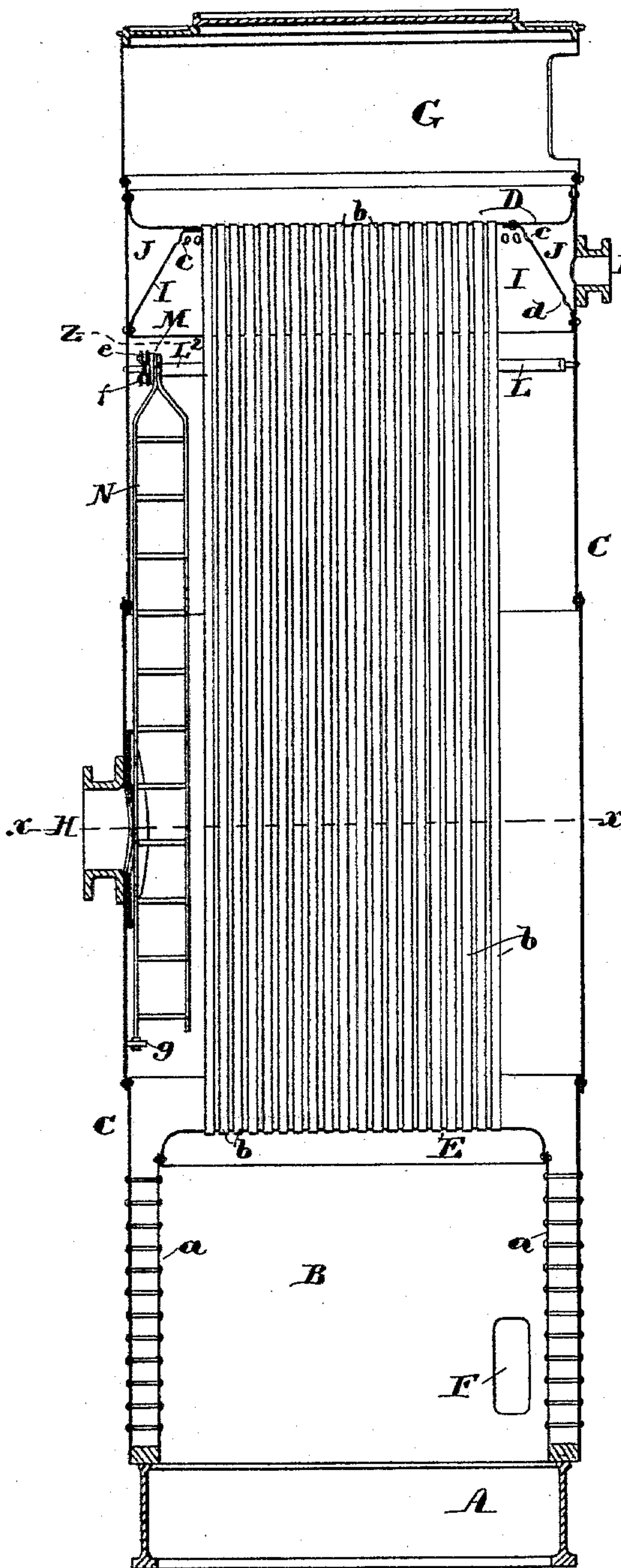


Fig. 3.

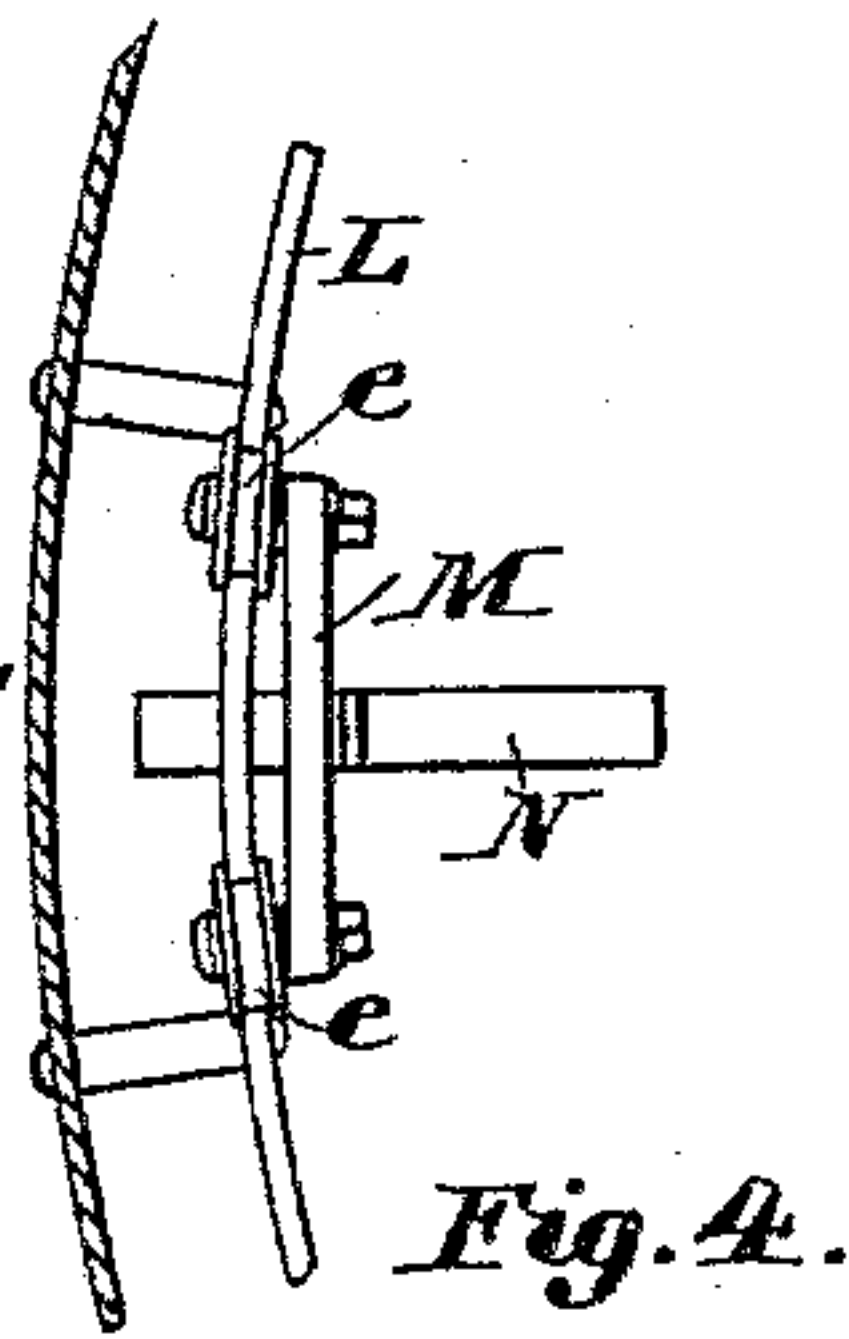


Fig. 4.

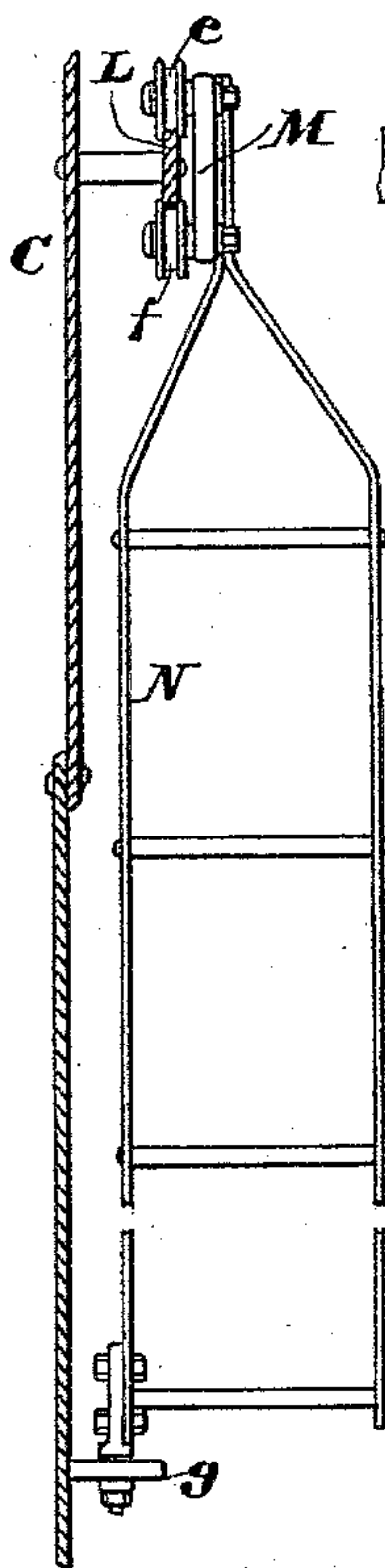


Fig. 5.

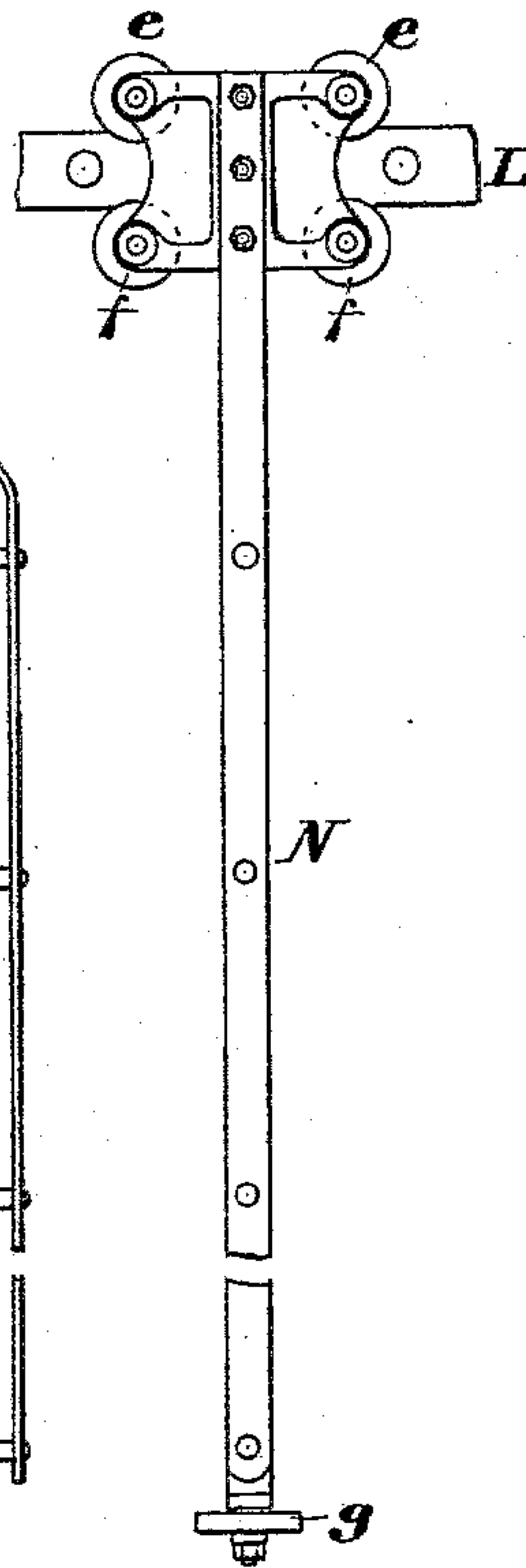


Fig. 6.

Witnesses:
Walter O. Lombard.
George H. Pomeroy.

Inventor:
Francis W. Dean,
by N. O. Lombard
Att'y.

UNITED STATES PATENT OFFICE.

FRANCIS W. DEAN, OF CAMBRIDGE, MASSACHUSETTS.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 565,106, dated August 4, 1896.

Application filed April 28, 1896. Serial No. 589,373. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS W. DEAN, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Steam-Boilers, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to steam-boilers, and particularly to that class of steam-boilers which are termed "upright" boilers; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the accompanying drawings, forming a part of this application, and to the claims hereto appended, and in which my invention is clearly pointed out.

Figure 1 of the drawings is a plan of an upright boiler with the smoke-box removed and illustrating my invention. Fig. 2 is a horizontal section on line *xx* on Fig. 3. Fig. 3 is a vertical section on line *yy* on Figs. 1 and 2, drawn to a reduced scale. Fig. 4 is a partial section on line *zz* on Fig. 3 and showing the inspection-ladder in plan. Figs. 5 and 6 are elevations of the inspection-ladder, viewed at right angles to each other. Figs. 4, 5, and 6 are drawn to a scale nearly twice as large as Figs. 1 and 2.

In the drawings, A is the ash-pit; B, the fire-pot or furnace, the grate being omitted as unnecessary to the proper understanding of my invention.

C is the main shell of the boiler, extending from the ash-pit to a point above the upper tube-sheet D and connected near its lower end by suitable screw-stays to the cylindrical wall *a* of the fire-box B in a well-known manner.

E is the lower tube-sheet, and *b b* the fire-tubes, extending from the tube-sheet E to and through the tube-sheet D, as shown.

F is the fire door, opening, or frame, and G is the smoke-box, which may be of any well-known construction.

A somewhat serious objection to cylindrical tubular boilers as heretofore constructed is that but a very small portion of the inner surface of the shell can be inspected, because of the fact there is not sufficient space between the shell and the tubes for even a small person to enter, and the further fact that there

is no manhole provided between the tube-sheets. To obviate this objection, I so arrange the tubes relative to the shell that there is a space between said tubes and the inner surface of the shell for the free passage of an inspector entirely around the cluster of tubes, so that every part of the inner surface of the shell between the tube-sheets may be readily inspected. To accomplish this, I make the shell of substantially the same diameter throughout its length, with water-legs surrounding the fire-pot or furnace, and provide a manhole H in said shell at any suitable or convenient point above the lower tube-sheet E, as shown in Figs. 2 and 3.

When a sufficient space is provided between the tubes and the shell for the passage of an inspector, it is necessary that the outer portion of the upper tube-sheet D should be strengthened or supported by suitable stays.

In carrying out my invention I secure to said shell and tube-sheet D an annular stay-sheet I in the form of a frustum of a hollow cone, thereby forming an annular chamber J, having a triangular cross-section, as shown in Fig. 3. Near the top edge of this stay-sheet I form therein a large number of small holes *c*, at equal distances from each other, around the entire circle of said sheet, through which holes steam may pass from the steam-space below said sheet and the tube-sheet D to the chamber J, from which it may be drawn through the outlet-nozzle K and conveyed by suitable pipes to any desired point where it is to be used. By this construction I am enabled to draw the steam from the boiler at the side instead of from the top of the smoke-box, which in many cases would be a very great advantage, and at the same time draw the steam evenly from all sides of the main steam-space and thus maintain the water in the boiler at the same height on all sides of the boiler. The sheet I is also provided with a single small hole *d* near the junction of said sheet with the shell for the purpose of draining the chamber J.

Just below the sheet I is mounted an annular track-rail L, secured to the shell C at a suitable distance inside thereof by suitable rivets and thimbles, as shown in Figs. 3, 4, 5, and 6. Upon this track-rail L is mounted the carriage M, having two wheels *e e* to bear

upon the upper edge of said rail and two wheels *f f* to engage the under edge of said rail, all of said wheels having grooved or flanged edges to receive the edges of said rail in such a manner that said carriage cannot be accidentally displaced or run off the track.

N is a ladder suspended from said carriage M, to which it is securely riveted at its upper end, and has mounted upon a suitable journal, formed upon or secured to the lower end of its outer rail, the wheel *g*, arranged to roll in contact with the inner surface of the shell, as shown.

By the use of the ladder N the inspector may pass entirely around the cluster of tubes and by climbing up or down said ladder may inspect all parts of the inner surface of the shell C between the tube-sheet E and the stay-sheet I.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an upright cylindrical tubular steam-boiler, the combination of an outer shell; an upper and a lower tube-sheet; a cluster of fire-tubes arranged centrally of said shell and set in and extending through said tube-sheets at a sufficient distance from said shell

to leave an unobstructed annular passage between said tubes and shell of a width to permit the passage of an inspector entirely around said cluster of tubes within said shell; a manhole through said shell between said tube-sheets; an annular track-rail mounted in a fixed position within said shell; and a ladder supported upon and movable along said rail substantially as described.

2. The combination of the cylindrical shell *c*; the tube-sheets D and E; the cluster of tubes *b*; the manhole H located between said tube-sheets; the annular track-rail L; the carriage M provided with the wheels *e, e*, and *f, f*; the ladder N firmly secured to and pendent from said carriage; and the wheel *g* mounted on the lower end of said ladder and arranged to roll in contact with the inner surface of said shell.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 27th day of April, A. D. 1896.

FRANCIS W. DEAN.

Witnesses:

N. C. LOMBARD,

GEORGE H. BROWN.