(No Model.)

2 Sheets—Sheet 1.

J. C. BENJAMIN.

TUBULAR BOILER.

No. 330,202. Patented Nov. 10, 1885.

Fig 1

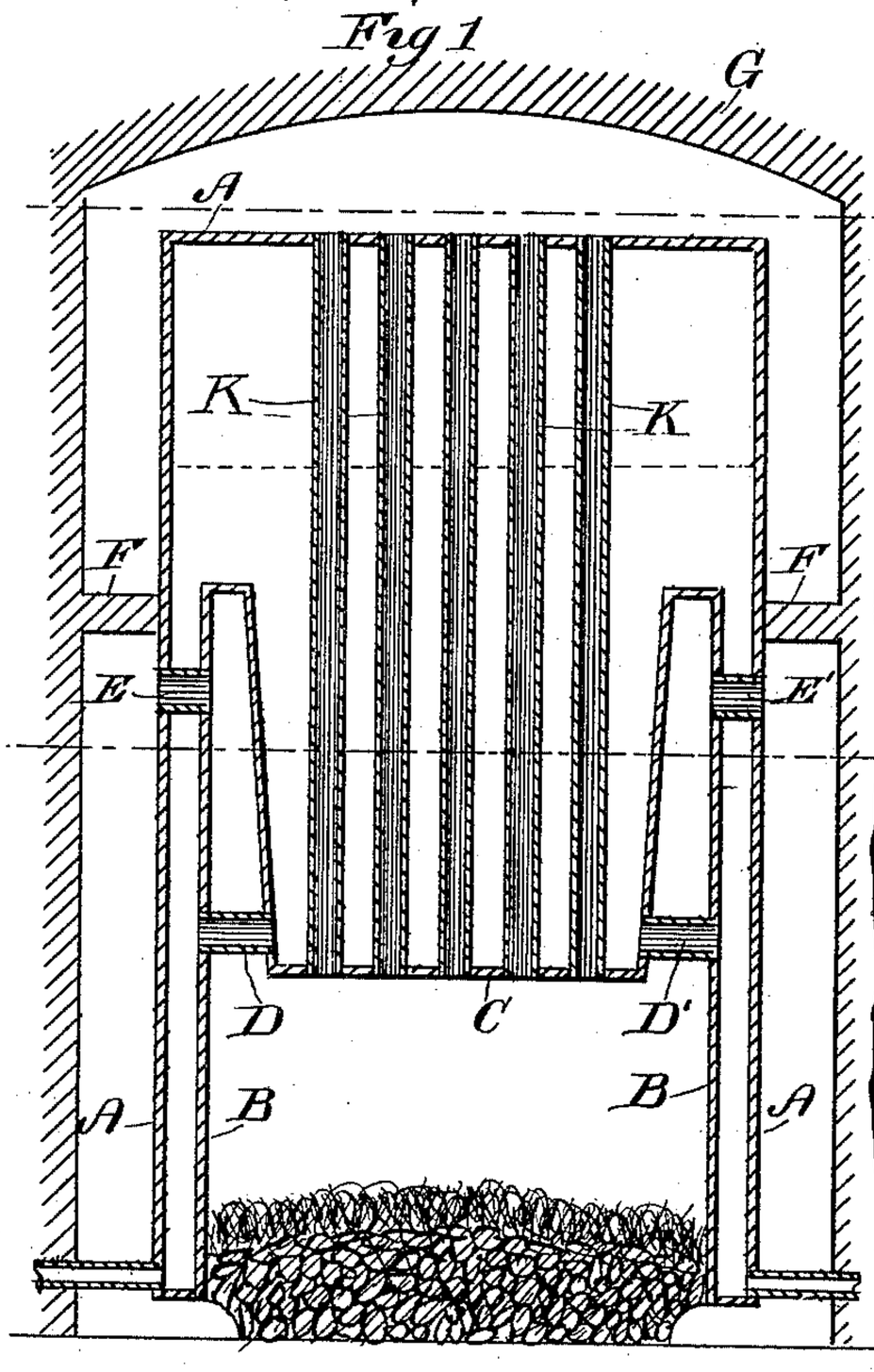


Fig 2

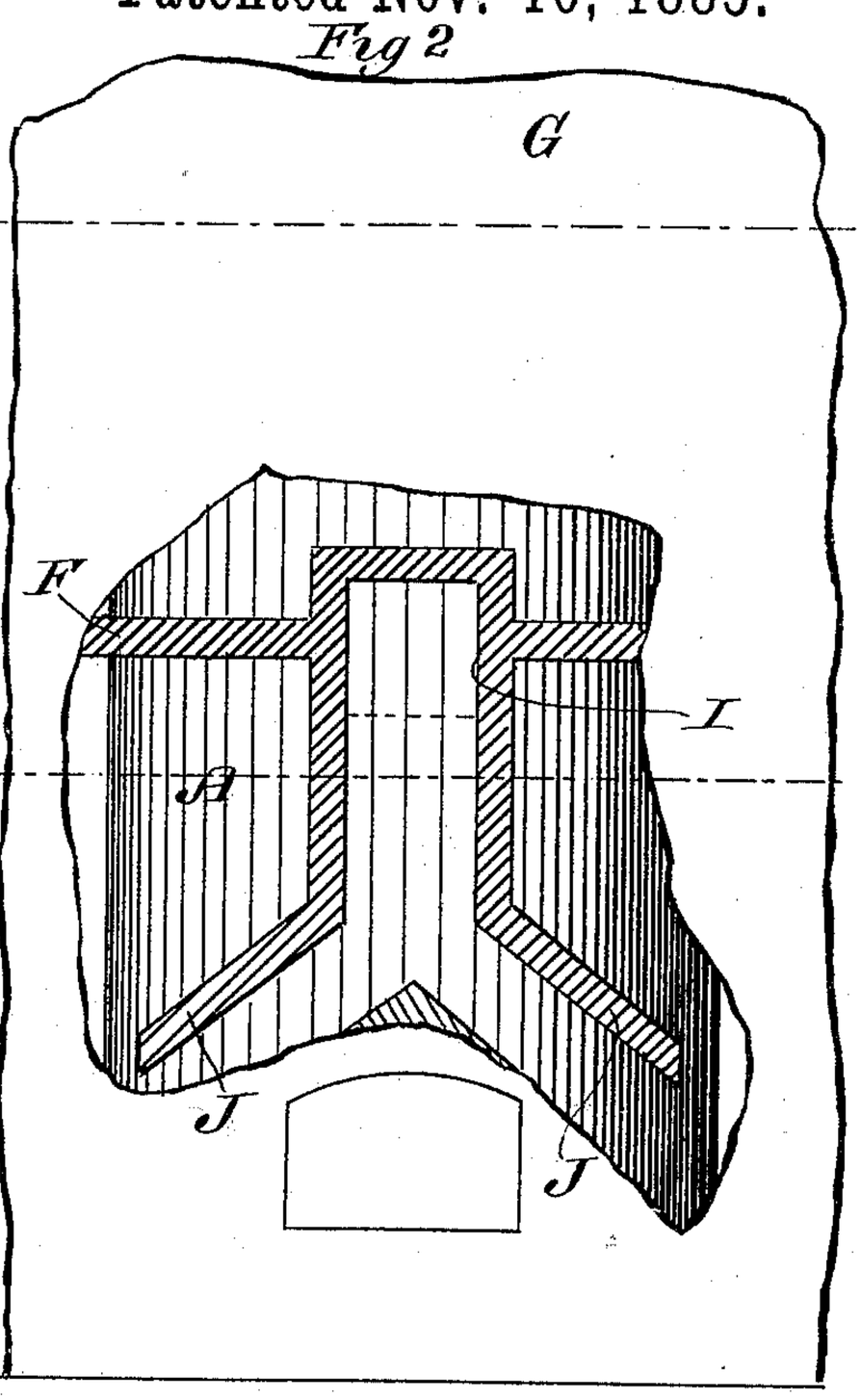


Fig 3

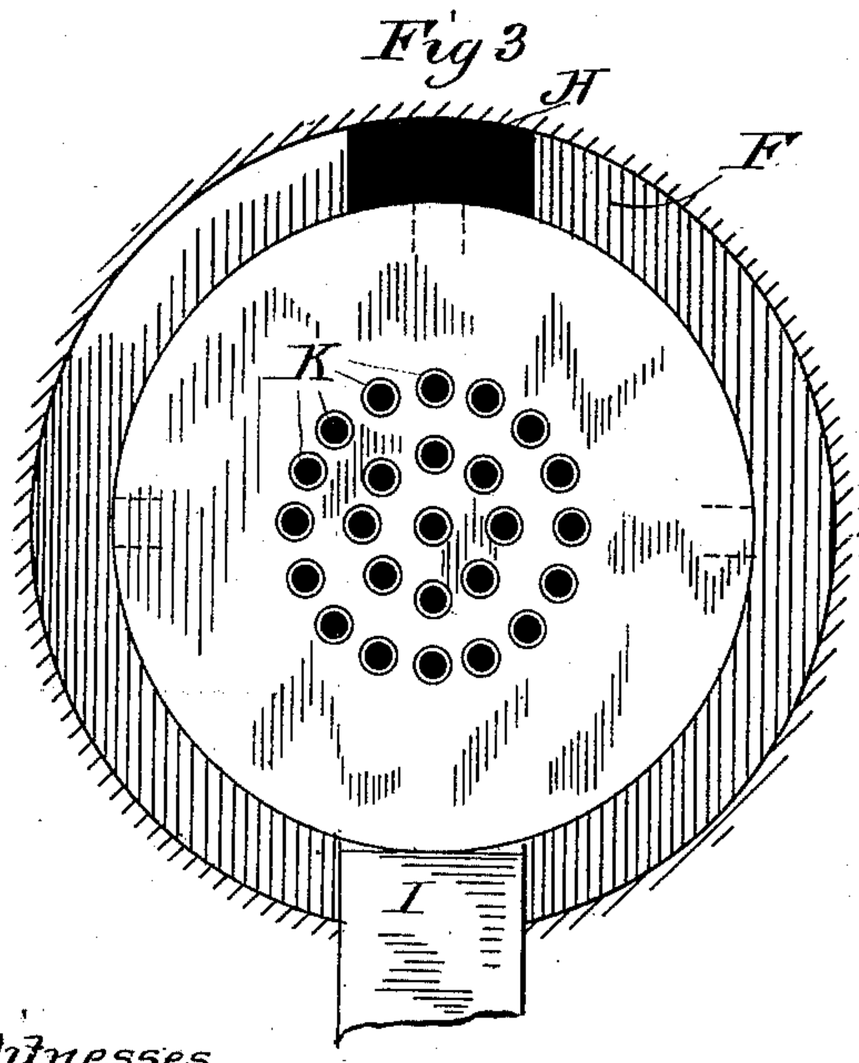
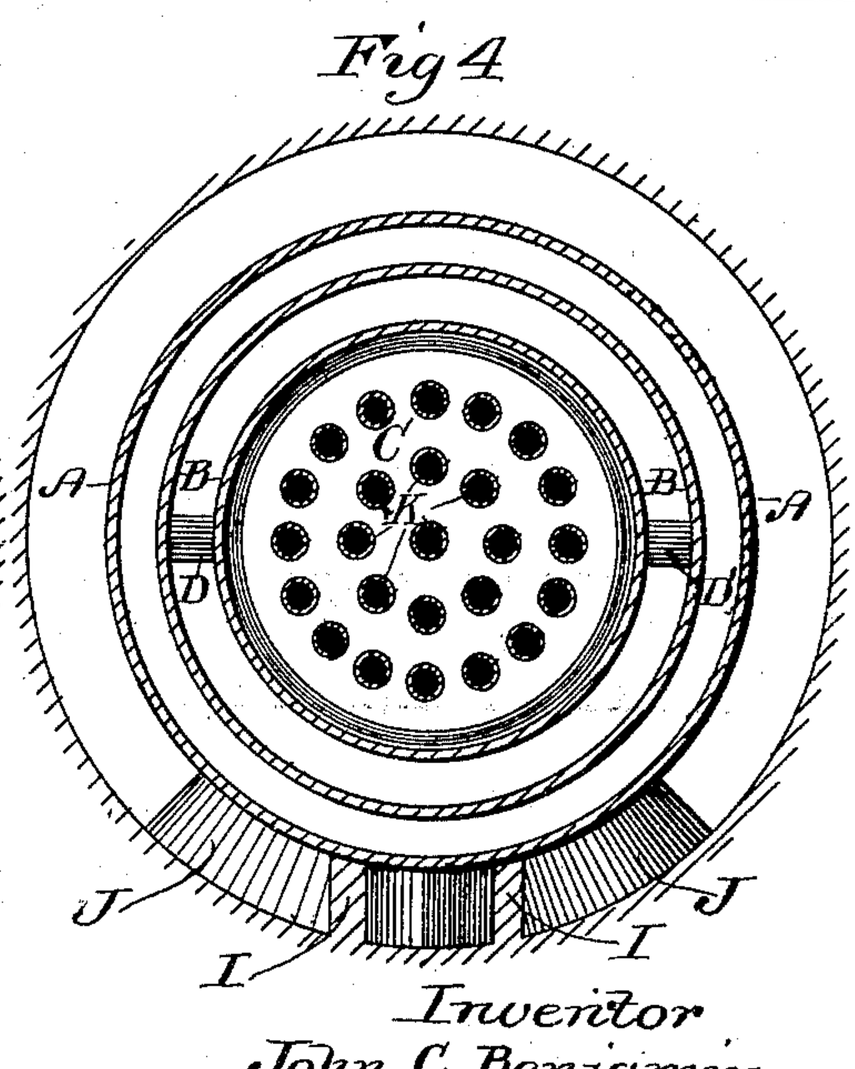


Fig 4



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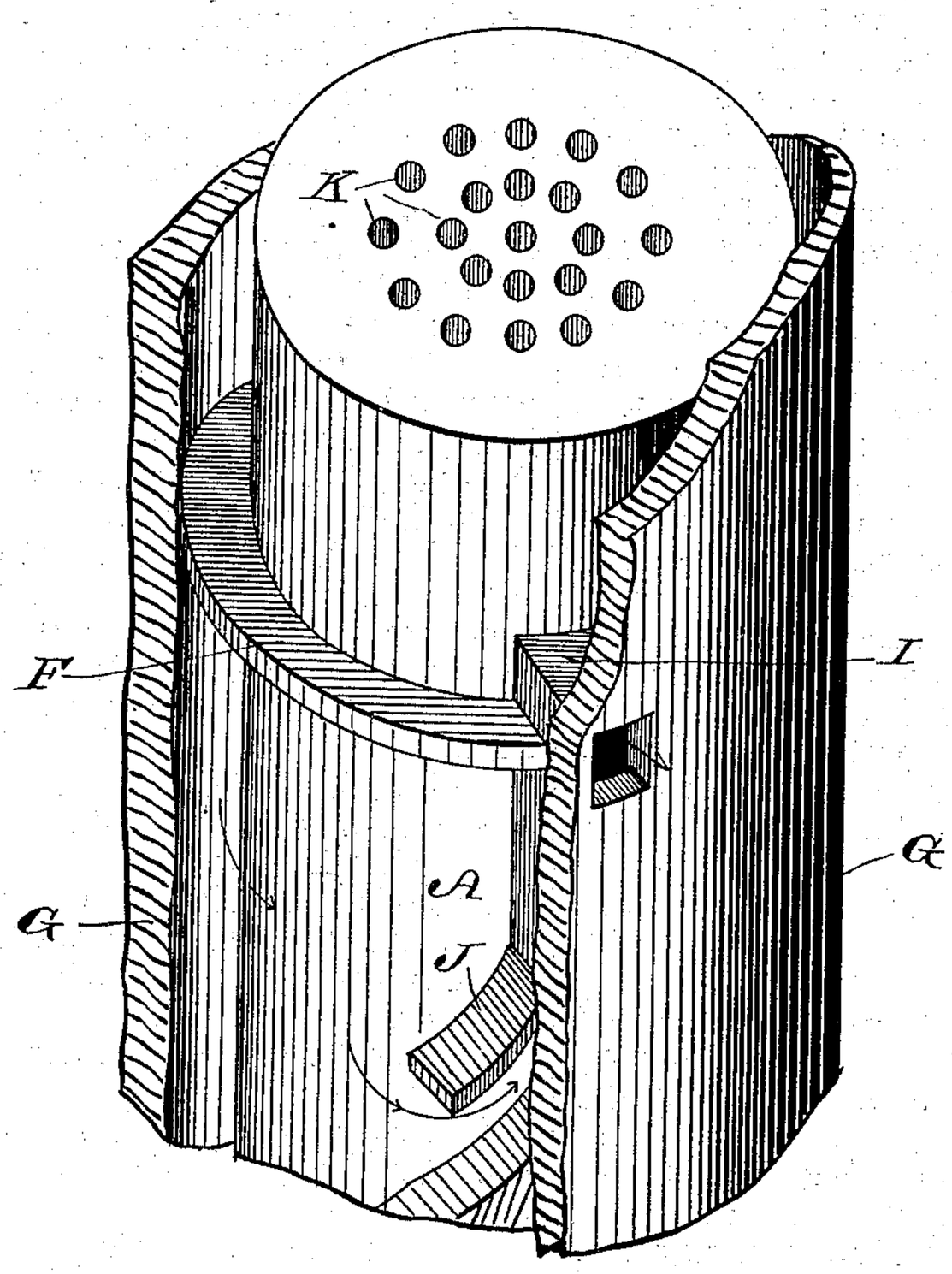
(No Model.) 2 Sheets—Sheet 2.

J. C. BENJAMIN.

TUBULAR BOILER.

No. 330,202. Patented Nov. 10, 1885.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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TUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 330,202, dated November 10, 1885.

Application filed April 16, 1885. Serial No. 162,383. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BENJAMIN, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Tubular Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain novel and useful improvements in upright tubular boilers; and it has for its object to provide a boiler of this description which shall have the greatest possible amount of heating-surface in proportion to the space occupied; and with this end in view my invention consists in the details of construction and combination of elements hereinafter fully explained, and then specifically designated by the claims.

In order that those skilled in the art to which my invention appertains may fully understand its construction and operation, I will proceed to describe the same in detail, referring by letter to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central vertical section of my improved boiler; Fig. 2, a front elevation, the brick-work being partly broken away to show the exit-flue; Fig. 3, a section taken at the line *x x* of Fig. 1; Fig. 4, a section taken at the line *y y* of Fig. 1; and Fig. 5 is a perspective with the brick-work broken away, showing the location of the chimney and wings.

Similar letters denote like parts in the several figures of the drawings.

A is the exterior shell of the boiler, and within this is an inner shell, B, which I preferably extend upward from the grate to a point above the horizontal center of the boiler, and thence downward, and secure thereto the lower head, C. D D′ are conduit-pipes, which establish communication between the inner and outer walls of the shell B. E E′ are similar pipes, by means of which the products of combustion may pass outside the shell A, as will be presently explained. F is a horizontal partition extending clear around the shell A and the external brick-work, G, and H is a vent in said partition. At the bottom of the brick-work, and immediately joining the chimney I, are wings J, underneath which the smoke and gas may pass into said chimney, as will be presently explained.

The operation of my boiler and the results attendant thereon are as follows: The boiler is filled with water to about the level shown in dotted lines in Fig. 1. The products of combustion rise upward through the tubes K into the space between the brick-work and the outer shell; thence downward through the vent H into the chamber below the partition F, and finally underneath the wings J into the chimney; also, the products of combustion rise up into the space formed by the interior and exterior walls of the inner shell, and pass out into the chamber below the partition F through the pipes E E′. By means of the pipes D D′ the water may circulate from the inner shell to the outer, and great heating-surface is afforded.

The peculiar arrangement of my boiler and the manner in which the water is distributed therein enable me to utilize nearly all the heat from the furnace, and also an exceedingly simple and economical boiler is produced.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a tubular boiler, the combination, with an outer inclosing-shell, of an inner shell extending upward within the former and then downward and forming the bottom of the boiler, a wall inclosing the boiler, horizontal partition between the outer shell and said wall, vent in said partition, and wings at the bottom of the boiler and extending directly to the chimney, substantially as set forth.

2. The combination of the outer shell, A, inner shell, B, extending upward and then downward within the former, conduits D D′ between the two portions of the inner shell,

conduits E E′, communicating from the inner shell to the space without the outer shell, wall G, inclosing the said space, partition F between the said wall and the shell A, vent H in said partition, and wings J, arranged between the wall and said shell, and underneath which the smoke and gas may escape to the chimney, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN C. BENJAMIN.

Witnesses:
S. S. WILLIAMSON,
H. T. SHELTON, Jr.