J. COWHIG.

Fire-Tube Steam-Boiler.

No. 212,301. Patented Feb. 18, 1879.

Fig. 1

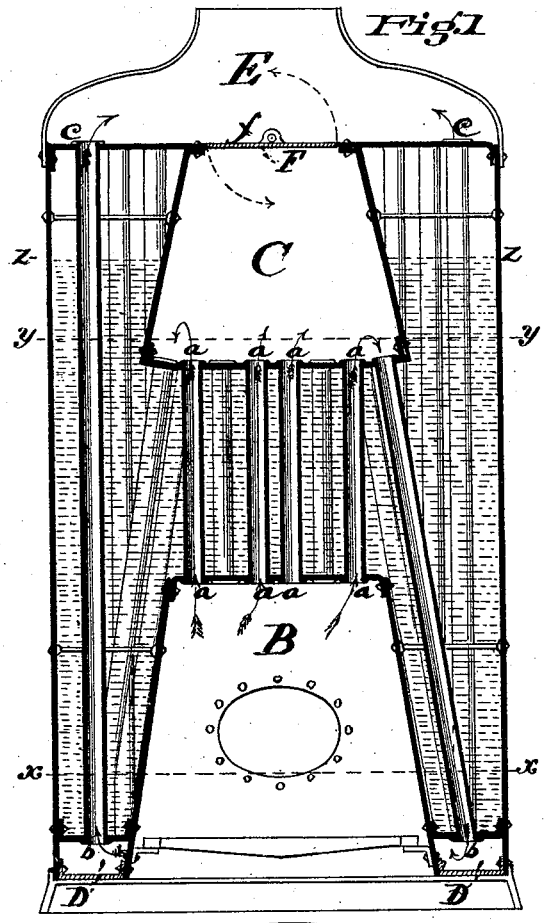



Fig. 2

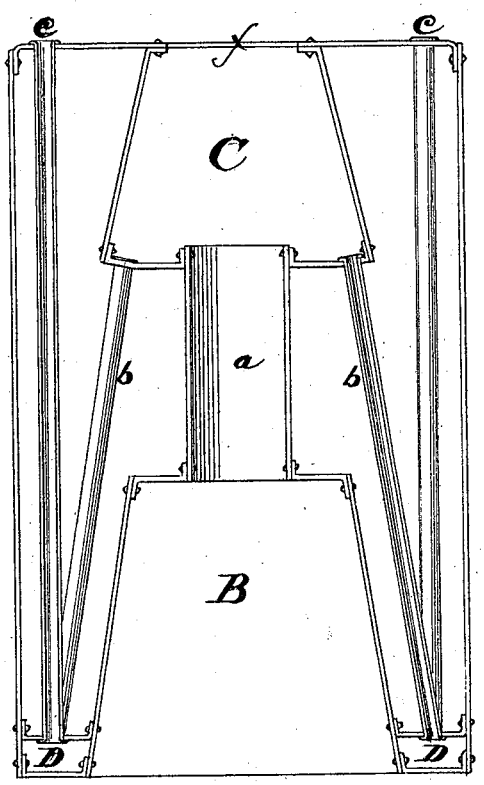



Fig. 3

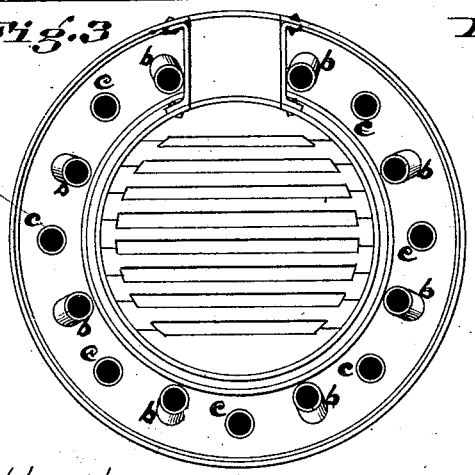
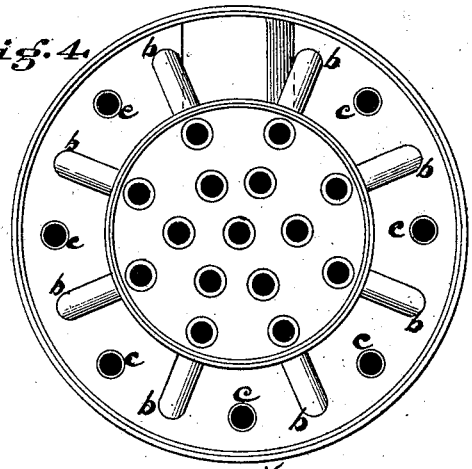


Fig. 4



Attest

Edgar J. Goss.

W. A. Hamilton Jr.

Inventor

Jerry Cowhig.

by Hosea V. Ellsworth,

Attorneys.

# UNITED STATES PATENT OFFICE.

JERRY COWHIG, OF RICHMOND, INDIANA.

## IMPROVEMENT IN FIRE-TUBE STEAM-BOILERS.

Specification forming part of Letters Patent No. **212,301**, dated February 18, 1879; application filed November 29, 1878.

*To all whom it may concern:*

Be it known that I, JERRY COWHIG, of Richmond, Wayne county, Indiana, have invented a new and useful Improvement in Fire-Tube Steam-Boilers, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a vertical sectional view of my improved boiler; Fig. 2, a vertical sectional diagram, showing a modification in construction; Fig. 3, a plan section of the boiler at the line *x x;* Fig. 4, a plan section at the line *y y*.

My invention relates to vertical return-flue boilers, and is designed to afford a more perfect utilization of the heat, economize the cost of construction and repairs, facilitate the cleaning of the flues, and to afford means of regulating and changing the draft.

To this end it consists in such a construction of the boiler and arrangement of its flues and a combustion-chamber, in combination with a damper adapted to change the course of the draft, as to effect these results.

I construct the boiler A with a central fire-box, B, and a combustion-chamber, C, connected by a flue or flues, *a*. The combustion-chamber C is preferably conical in section, located partly below the water-line Z Z, and open at its top *f* into the smoke-arch E.

From the bottom of the combustion-chamber C, near the side walls, diving-flues *b* extend downward and outward to the bottom of the boiler, and to an annular space, D, formed by the outer shell of the boiler and the wall of the fire-box B, beneath the water-leg. From the same annular space rise vertical flues *c* within the boiler to the smoke-arch E above.

The combustion-chamber C, being contracted toward the top, affords a larger steam-space in the boiler above the water-line, and, being open at the top, permits easy access to the inclined flues *b*, which may be cleaned by a long-handled brush passed through the opening *f* of the combustion-chamber. In this opening is placed a butterfly-valve or register, which, when opened, permits the products of combustion to escape freely into the smoke-arch E, but when closed compels them to descend through the flues *b* into the annular space D, below, where they enter and ascend through the flues *c*, and escape.

In operation, and when the fire is started, the damper or valve F is opened, thus allowing a free draft into the flue; but when the fire is well under way the valve F is closed, and the products of combustion compelled to pass through the flues *b* and *c*, as stated.

The bottom of the combustion-chamber C and the joints of the flues *a* and *b* therewith being below the water-line, they are securely protected against the effects of heat; and the joints of flues *c* with the top of the boiler, being at the extreme limit of travel of the products of combustion through the boiler, are likewise secure from injury from overheating.

Having fully described my invention, I claim—

1. The combination, in a vertical steam-boiler, of fire-box B, open combustion-chamber C, valve F, connected with said combustion-chamber and controlling its said opening, ascending flues *a* and descending flues *b*, both entering the bottom of said chamber, and ascending flues *c*, all arranged and operating substantially as specified.

2. The conical combustion-chamber C, situated partly beneath the water-line and opening through the top of the boiler, in combination with ascending flues *a*, outwardly-inclined descending flues *b*, and valve F, controlling the upper opening of said combustion-chamber, substantially as and for the purpose specified.

3. The construction and arrangement, in a vertical steam-boiler, of open conical combustion-chamber C, ascending flues *a*, and outwardly-inclined descending flues *b*, said flues entering the bottom of the combustion-chamber on a line with its upper opening, substantially as and for the purpose specified.

In witness whereof I have hereunto set my hand this 19th day of November, 1878.

JERRY COWHIG.

Witnesses:

L. M. HOSEA,

E. A. ELLSWORTH.