(No Model.) 4 Sheets—Sheet 1.

J. H. CUNNINGHAM.

BOILER.

No. 399,975. Patented Mar. 19, 1889.

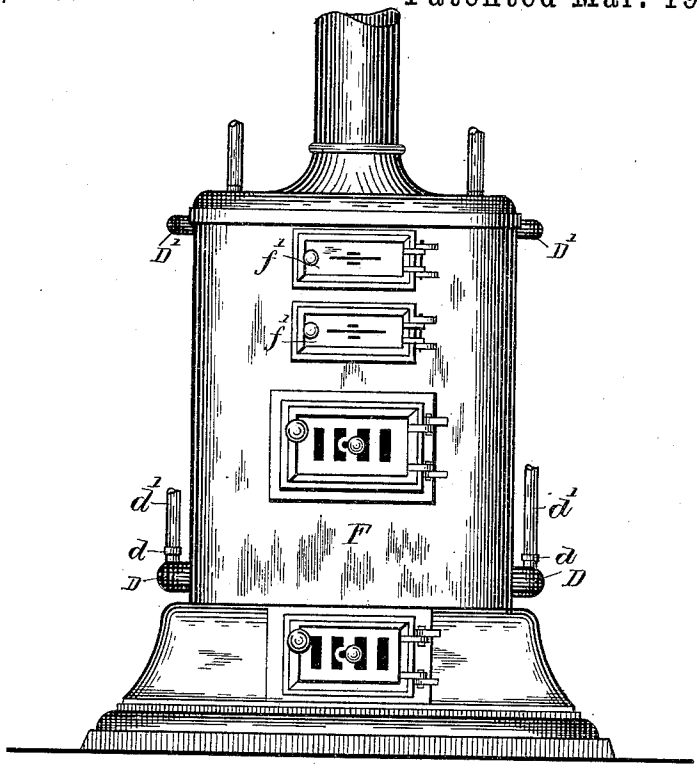


Fig. 1.

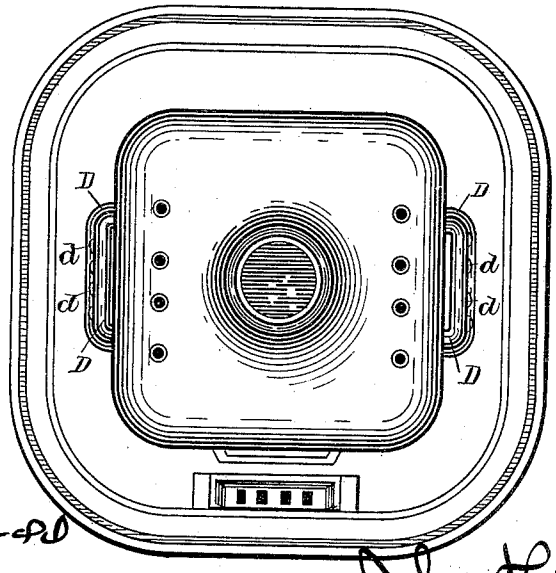


Fig. 2.

WITNESSES.

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J. H. CUNNINGHAM.

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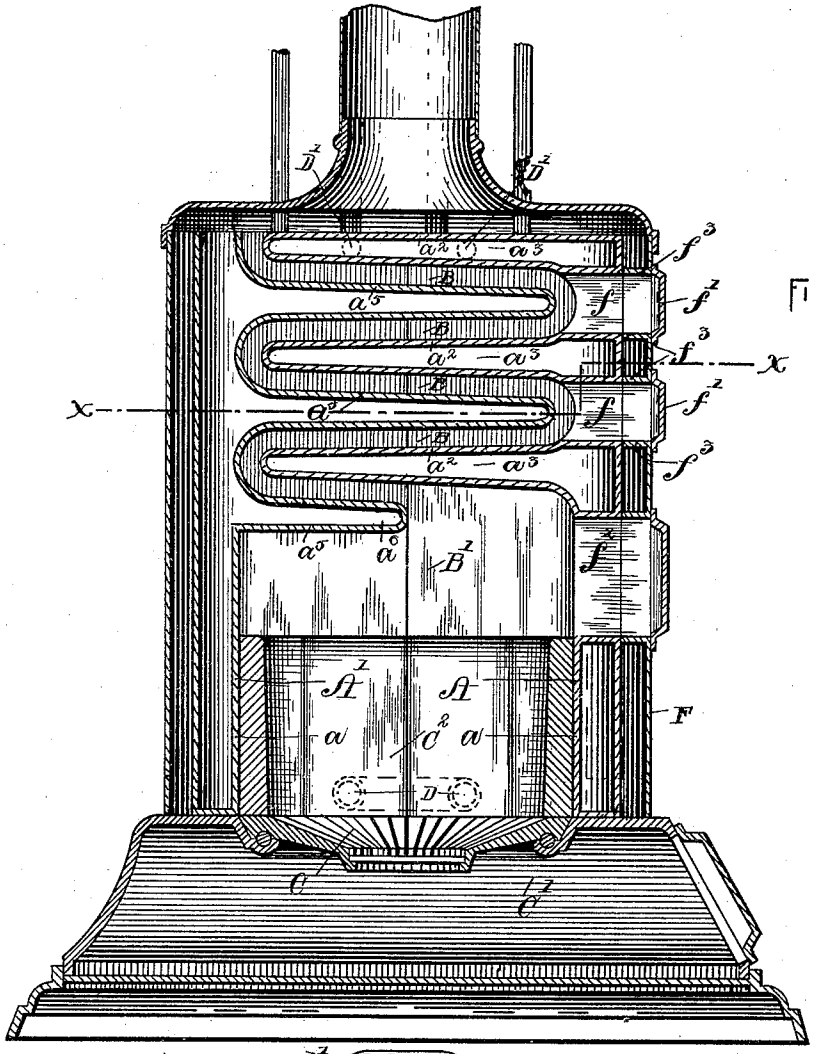


Fig. 3.

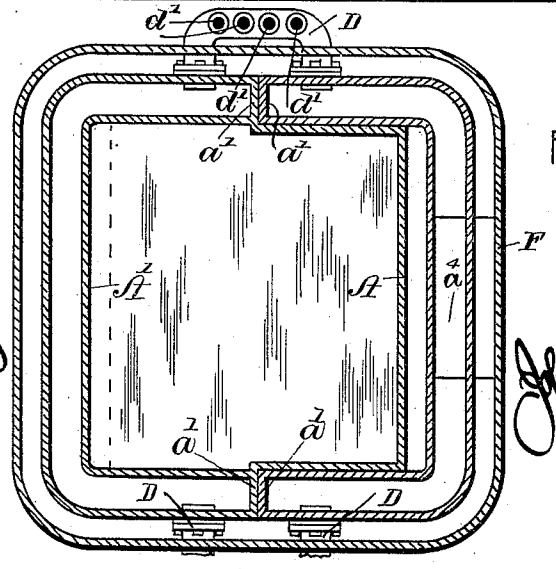


Fig. 4

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(No Model.) 4 Sheets—Sheet 3.

J. H. CUNNINGHAM.

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No. 399,975. Patented Mar. 19, 1889.

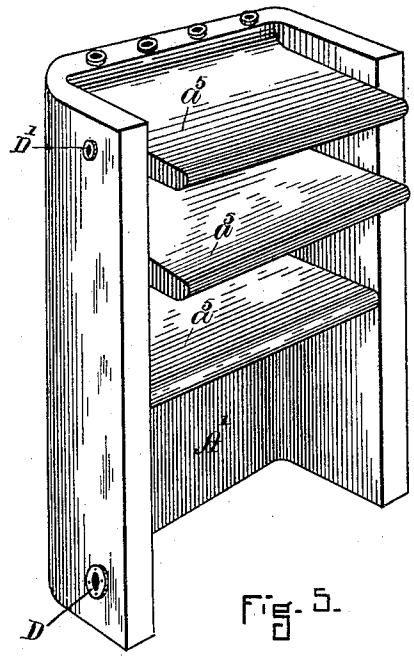


Fig. 5.

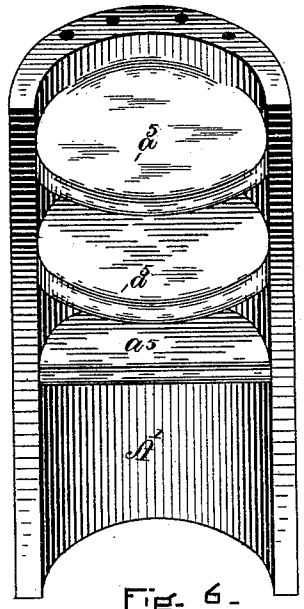


Fig. 6.

WITNESSES.

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(No Model.)

4 Sheets—Sheet 4.

J. H. CUNNINGHAM.

BOILER.

No. 399,975. Patented Mar. 19, 1889.

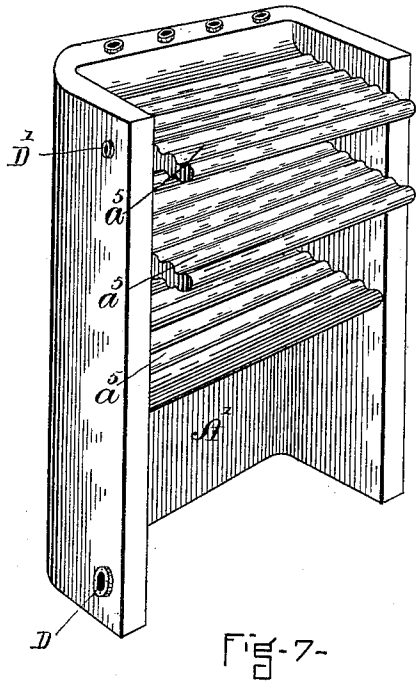


Fig. 7.

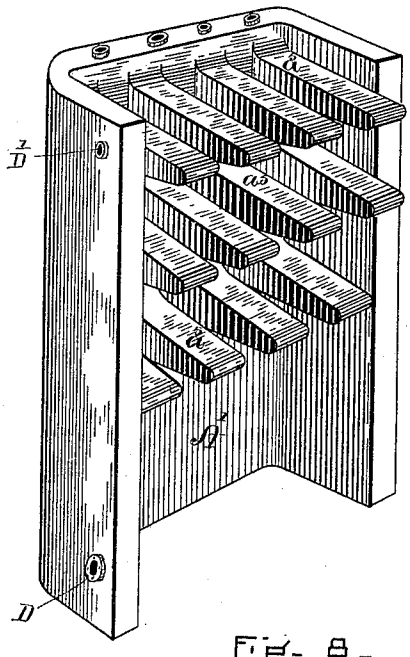


Fig. 8.

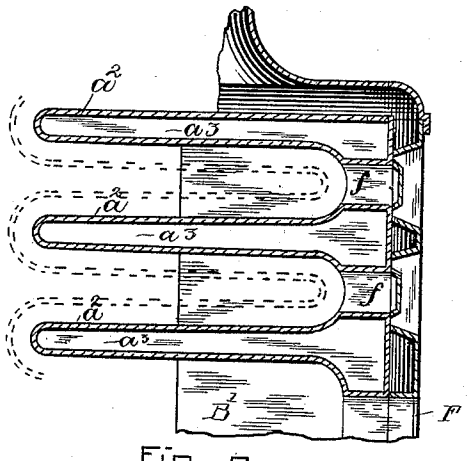


Fig. 9.

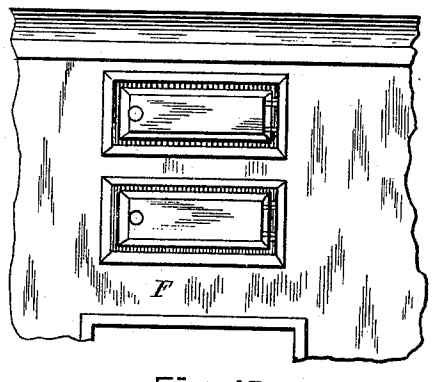


Fig. 10.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN H. CUNNINGHAM, OF CHELSEA, MASSACHUSETTS.

BOILER.

SPECIFICATION forming part of Letters Patent No. 399,975, dated March 19, 1889.

Application filed May 14, 1888. Serial No. 273,819. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. CUNNINGHAM, of Chelsea, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Impovement in House-Heating Boilers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The object of the invention is to provide a house-heating boiler which combines efficiency in operation with cheapness of construction; and it consists, essentially, of two cast-metal shells, practically counterparts of each other, each of which is in one sense a complete boiler, and which are united together and connected with each other to form a smoke-flue of peculiar shape, as hereinafter specified.

The invention further relates to various details of organization and construction, all of which will hereinafter be described.

In the drawings, Figure 1 is a view in elevation of a house-heating boiler having the features of my invention. Fig. 2 is a plan view thereof. Fig. 3 is a vertical central section taken from front to back and enlarged. Fig. 4 is a horizontal section upon the line x x of Fig. 3. Fig. 5 is a view in perspective representing one part of a square boiler. Fig. 6 is also a view in perspective representing one part of the boiler when made in a circular form. Figs. 7 and 8 are views in perspective of one part of the boiler to illustrate slight modifications. Figs. 9 and 10 show in section and elevation a modification of a part to which reference is hereinafter made.

A represents one part or shell of the boiler, and A′ the other. Each part is in substance a hollow shell in one casting, having the lower section, a, which surrounds and forms half the fire-pot and combustion-chamber, and may be semi-cylindrical in form or rectangular in form, and horizontal sections which extend inwardly from the upper part of the shell and the vertical ends a', which abut. The part A has horizontal sections a^2, of any desired number, and each of these horizontal sections has a cavity, a^3, which connects with the vertical cavity a^4 of the part A. The part A′ has horizontal sections a^5, which are in every respect like the sections a^2, the lowermost section, a^6, however, not extending so far from the vertical wall of the part A′ as the other sections. These horizontal sections of each part A A′ are separated from each other by a space about three times the thickness of one of the horizontal sections, and the sections upon the part A′ are arranged to extend upon a line lower than the corresponding sections, a^2, of the part A, so that the sections a^2 of the part A enter the spaces between the sections a^5 of the part A′ and provide or form a zigzag or sinuous uptake or passage, B, for the products of combustion from the combustion-chamber B′.

C represents the grate; C′, the ash-pit; and C^2, the fire-pot, which may or may not have a lining, as desired.

The two parts A A′ are placed so that their ends a' abut, (see Fig. 4,) and they are secured together by the pipes D, which preferably extend from one part near the joints formed by the abutting of the ends a' to the other part. The two parts are likewise at or near their tops secured together by the pipes D′. These pipes D D′ serve two purposes—first, to fasten or secure the two parts A A′ of the boiler together, and, second, to provide a proper circulation of water from one part to the other. In addition to this the lower pipes, D D′, are provided with means for receiving and holding the ends of the return-pipes of the heating system, whereby the exhaust-steam or water is returned to the boiler; and I have represented as one means of forming this connection the pipes D as provided with threaded hollow bosses d. The bosses may be threaded upon their interior or exterior. In Fig. 1 I have shown this construction, and d' d' are the return or exhaust pipes. It is not necessary to have the pipes D D′ on both sides of the boiler; but I prefer this form of construction.

The boiler is represented as inclosed in a sheet-metal casing, F.

To remove soot, ashes, and other accumulations from the flue B, I have formed in the part A two openings, f, extending, preferably, from the front, and corresponding openings in the casing F, closed by the doors f'. These openings are arranged so that each provides access to two of the courses of the flue or up-

take, the ashes, soot, &c., being drawn from one course by a proper tool toward the opening and permitted to fall into the other course, and then pushed backward to the end of the next course to fall into the course below, this operation being continued until the lower course of the flue is reached, when it is drawn by the tool operated through the passage f^2 to the combustion-chamber into the fire-pot. A casing, f^3, extends from the openings f to the shell F.

In Figs. 9 and 10 I have represented the outer casing, F, as drawn in about the openings f, and doors for closing the openings secured to the shell of the boiler instead of to the casing F.

If desired, the lower or lower and upper surfaces of the horizontal sections a^2 a^5 may be corrugated to increase the heating-surface of the boiler, and I have represented the sections as thus shaped in Fig. 7. The horizontal sections a^2 a^5 may be separated or subdivided by vertical recesses or passages to provide a somewhat more direct course for the products of combustion from course to course of the flue, as shown in Fig. 8.

The boiler is cheaply made, and because of the form of the flue from the combustion-chamber and of the area of the heating-surface and its form (the water to a very considerable extent being held in thin flat bodies and subjected to heat from both sides) practically the full value of the heat from the gases of combustion is realized and the fullest value of the coal consumed obtained. It will be seen that the flue B is largely horizontal, and that each of the horizontal extensions a^2 a^5 of the boiler receive heat through both their surfaces, and that the water is disposed in them in wide thin bodies or layers.

It will be observed that the pipes D D′ serve to secure or fasten together the two parts of the boiler, and also serve to maintain circulation therein, and that the pipe or pipes D′ further act to receive the exhaust from the return-pipes of the system. The supply-pipes of the system are connected with the top plate of the boiler, the top plate of the boiler having the hollow bosses, which are provided with screw-threads upon their inner or outer edges to receive the ends of the pipes or connections.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A house-heating boiler in two parts, A A′, each of which is integral or in one casting and has horizontal sections of the width of the cavity of the boiler arranged to extend into integral horizontal spaces in the other to form a sinuous flue, all substantially as and for the purposes described.

2. The combination, in a heating-boiler, of the parts A A′, having thin flat overlapping sections a^2 a^5, and the pipes D D′, fastening or securing the two parts together, substantially as described.

3. The combination, in a heating-boiler, of the parts A A′, the lower connecting circulating pipe or pipes D, and the threaded inlet projections d, extending therefrom, substantially as described.

4. In a house-heating boiler, the combination of the part A, having the horizontal flat extensions a^2 and intermediate recesses, the part A′, having the horizontal extensions a^5, and the circulating-pipes D D′, connecting the parts A A′, substantially as described.

5. A house-heating boiler comprising the parts A A′, having the flat sections a^2 a^5, arranged to form the sinuous smoke-flue B, and openings f in one of the parts A A′ to the courses of the smoke-flue, and doors for closing the said openings, substantially as described.

JOHN H. CUNNINGHAM.

Witnesses:
F. F. RAYMOND, 2d,
E. P. SMALL.