(No Model.)

J. G. SMITH.

SECTIONAL WATER HEATER.

No. 412,554. Patented Oct. 8, 1889.

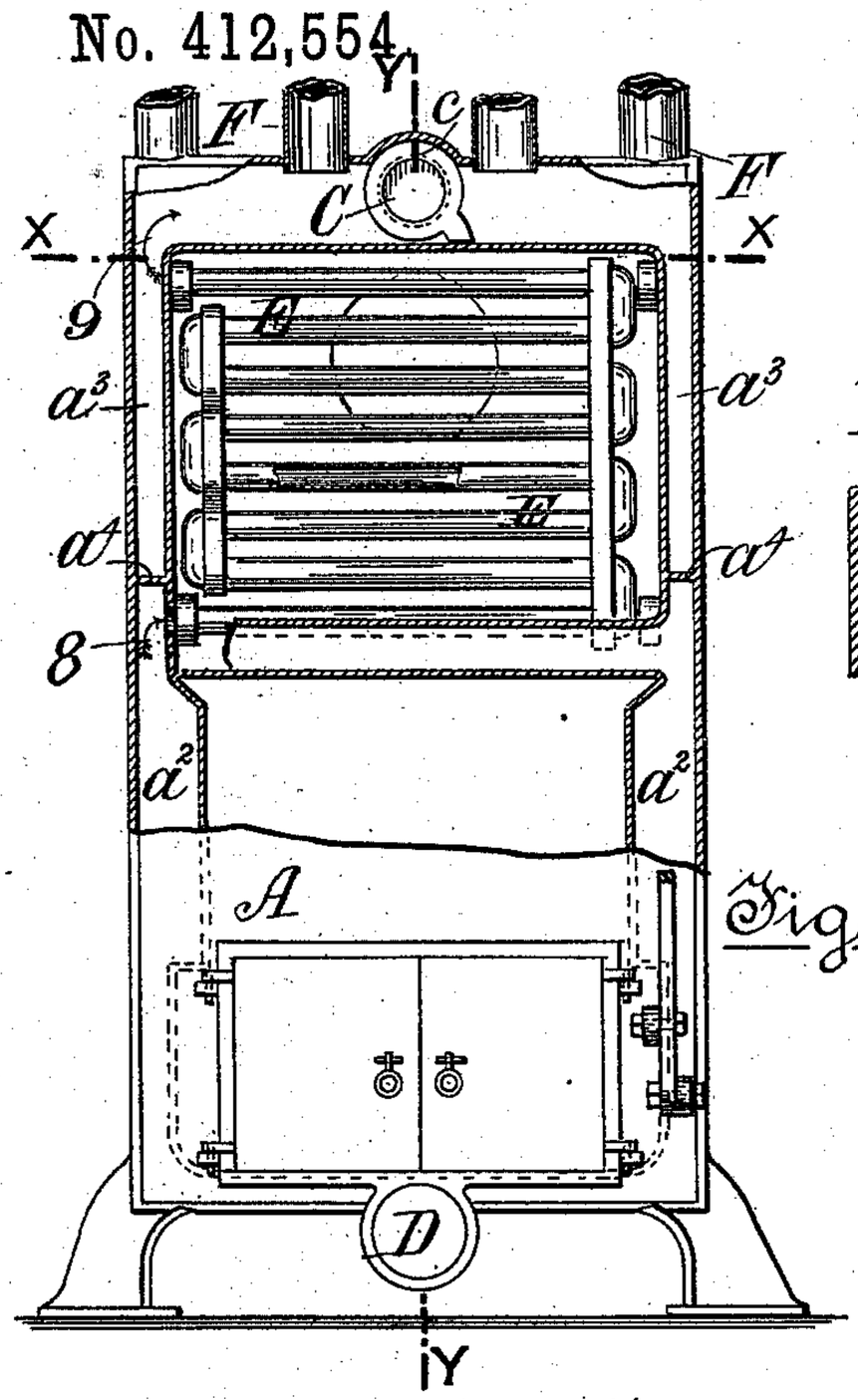

Fig. 1

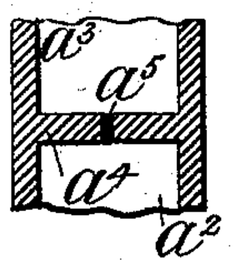

Fig. 7

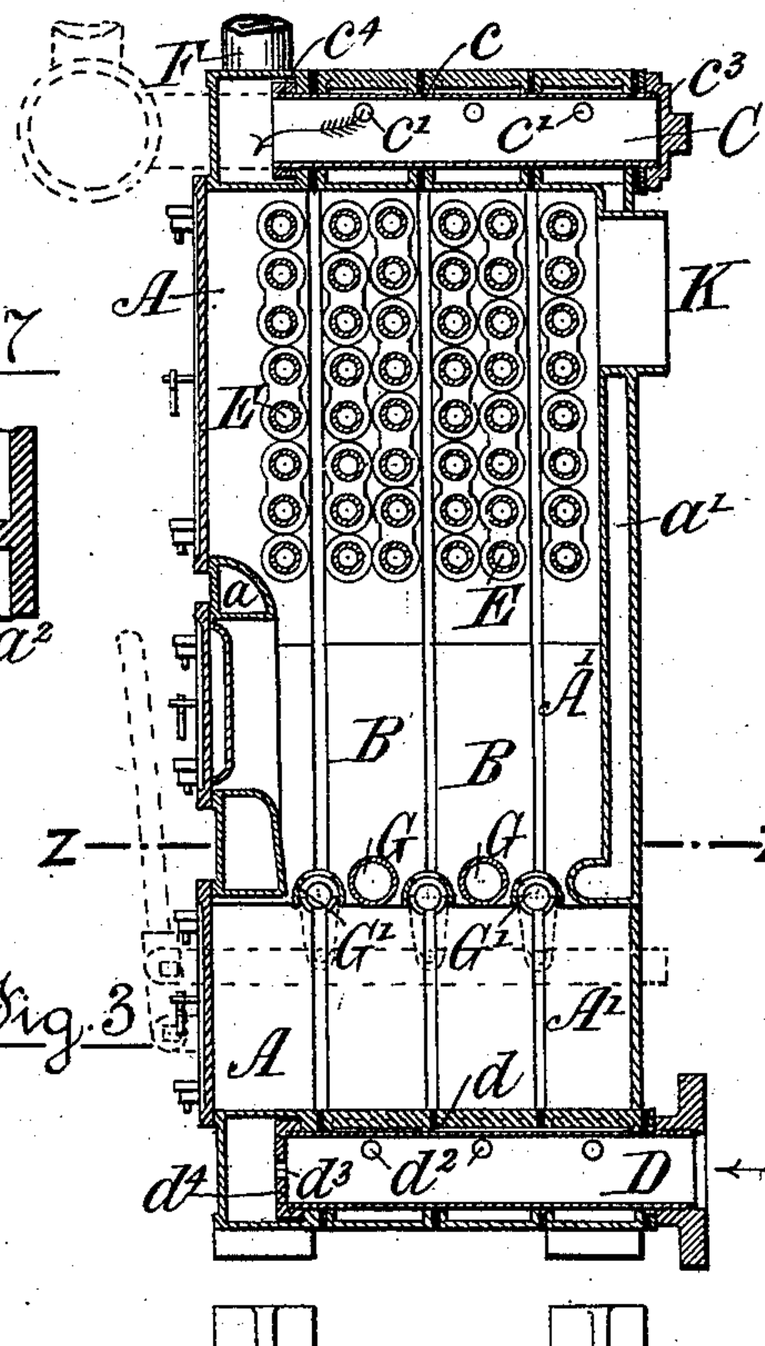

Fig. 3

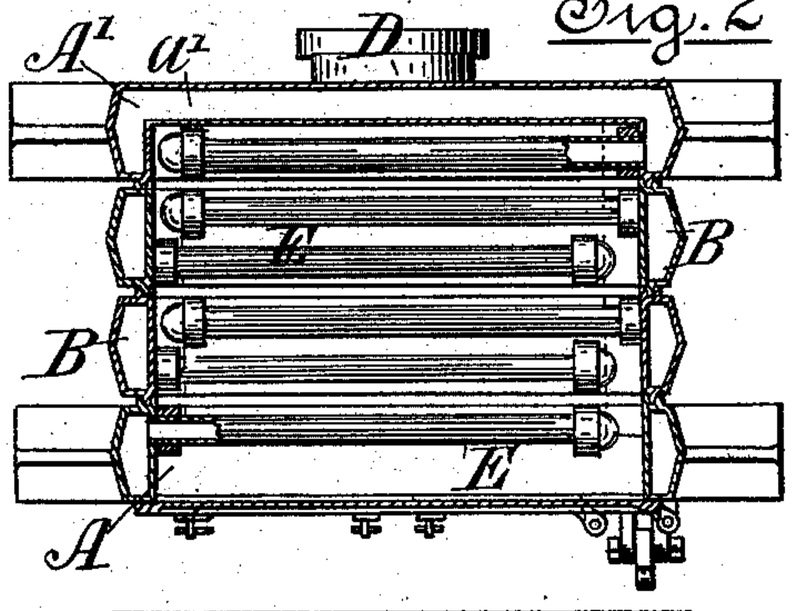

Fig. 2

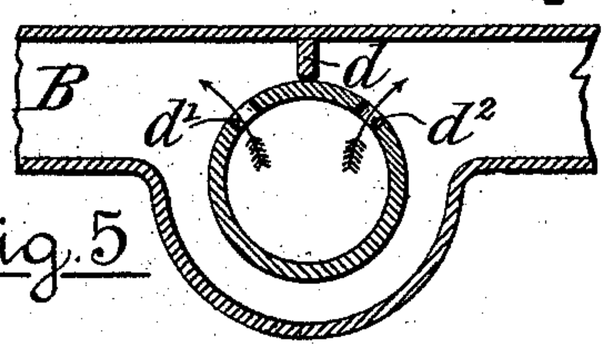

Fig. 5

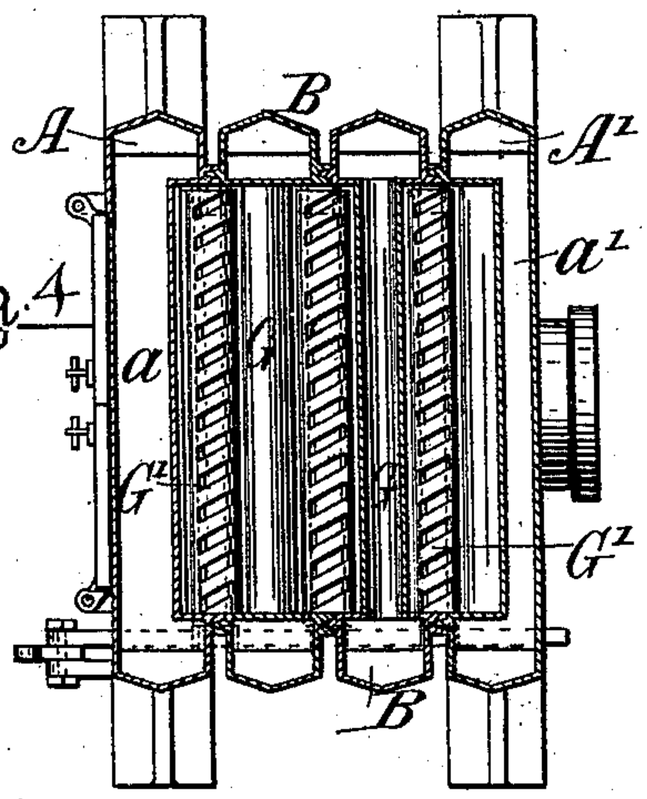

Fig. 4

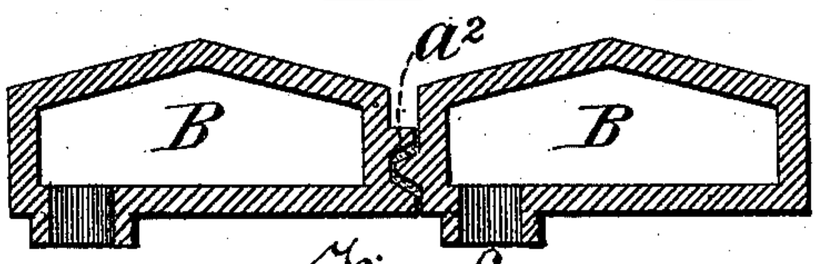

Fig. 6

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UNITED STATES PATENT OFFICE.

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SECTIONAL WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 412,554, dated October 8, 1889.

Application filed May 21, 1889. Serial No. 311,551. (No model.)

To all whom it may concern:

Be it known that I, JOHN GEORGE SMITH, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Sectional Hot-Water Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to heating-boilers composed of different sections and water pipes or ways through which the water will circulate in connection with a system of pipes for warming buildings, and has for its object to produce a boiler which will be at once simple and easy of construction, cheap in first cost, and provide for a rapid circulation and large amount of heating-surface.

It consists, broadly speaking, in a combination of cast vertical sections and coils of pipes or tubes, in connection with certain novel devices for securing the parts together and providing for a thorough circulation throughout. For full comprehension, however, of the details of construction, arrangements of parts, and the manner in which the invention will operate, reference must be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate like parts.

In said drawings, Figure 1 is a front view (partly in section) of my boiler. Fig. 2 is a sectional plan taken on line X X, Fig. 1. Fig. 3 is a vertical section taken on line Y Y, Fig. 1. Fig. 4 is a sectional plan taken on line Z Z, Fig. 3. Fig. 5 is an enlarged cross-section taken through the hollow bolt or tube and the lower part of one of the sections. Fig. 6 is an enlarged sectional plan of two of the sections, illustrating the joint between them. Fig. 7 is a detail of perforated check or diaphragm.

In the present case I show a boiler composed of four vertical sections cast separately and secured at top and bottom, and having single coils of pipes in the front and back sections and double coils in the two sections lying between them, as will be hereinafter more particularly described; but I may use a greater or less number of sections and coils, according to the work which is to be performed.

A is the front section, A′ the back section, and B B the intervening sections, said front and back sections having water-jackets a and a', respectively, opposite the fire-chamber, all of these sections being preferably cast in somewhat the shape shown, and arranged vertically side by side, the joints between them being preferably like that shown at a^2 in Fig. 6, and packed with fire-clay or furnace-putty, so as to make an air-tight and close connection.

The different sections are secured together at top and bottom by hollow bolts or tubes C and D, respectively, both of which are perforated opposite each section, so as to allow the water to circulate through them.

As shown in Fig. 1, the sections are divided into upper and lower chambers a^2 and a^3 by means of horizontal diaphragms or checks a^4, each section having in connection therewith one or more coils of pipes E. The lower end of each coil will connect with the lower chamber a^2, and the coil extends upward and rejoins the same section, but communicates with the upper chamber a^3 thereof preferably at the same side as the first connection.

d in Figs. 3 and 5 is a rib or flange cast in the interior of each section (with the exception of the front section) in such position that it will come over the center of the connecting tube or bolt D, and such hollow bolt D is perforated at two points d' and d^2 on either side of said flange d, for the purpose of preventing the water in the opposite sides of the different sections from meeting, and to insure the streams being carried to their different destinations in the most direct manner. There is a similar rib c above the upper hollow bolt C, and such upper bolt is also perforated in like manner at c' c'. The bolt D has its outer end in connection with the supply or return pipe, and has its inner end stopped, with the exception of a small aperture d^3, while the upper hollow bolt C is closed by a nut c^3 at its outer end, and is open at the inner end where it leads into the front section A. To

retain these bolts in position I prefer to screw them into nuts c^4 d^4, which are first cast separately and then inserted loosely during the casting of the front section; but this is not essential, as I may screw the ends of the hollow bolts directly into the metal of said front section.

The flow-pipes F F lead out from the front section alone, as shown in Figs. 1 and 3; but the hollow bolt may, if desired, project through the front section and be connected with an extension or header, from which the flow-pipes will then lead, as shown in dotted lines in Fig. 3.

In this class of furnace I prefer to use a grate partly formed of water-pipes connected at both ends with the sections and with the rocking bars arranged alternately therewith, such pipes being marked G and such rocking bars G′ in Figs. 3 and 4; but this is not essential.

While it is understood that the body of water in the upper compartment a^3 of each section is thoroughly separated from that in the lower compartment a^2, I prefer in most cases that the diaphragms or checks a^4 shall have one or more small perforations a^5, as shown in the detail, Fig. 7, for the purpose of preventing stagnation or the lodging of sediment in the lower part of the upper chamber. It must be borne in mind, however, that these perforations are so small that they will not affect the flow of the main body of the water through its proper channels.

The coils E are located the proper distance above the fire-chamber, and the smoke-pipe K will lead out from any suitable point.

The operation of my invention is as follows: The water enters the lower hollow bolt D (which serves also as the return) and passes thence through the perforations d' d^2 into the different sections, in which it rises until it meets the checks a^4, when it passes, as seen by the arrow 8 in Fig. 1, into the coils E, through which it flows, and then enters the upper chambers a^3, (see arrow 9,) and from thence through the perforations c' in the upper hollow bolt C, and out through its open end into the front section A, which when full will supply the flow-pipes F, and the water will thus be led throughout the system of heating-pipes and back to the return D. The water finds its way into the lower chamber of the front section and into the water-jackets a through the perforation d^3 in the end of the lower hollow bolt D.

What I claim, and desire to secure by Letters Patent, is as follows:

1. In combination, the sections, the hollow bolt D, extending transversely of and partially across the sections, said sections being independent and separated from each other, said bolt having openings in its sides communicating with the separate sections, the said bolt having also an inlet-opening at its outer end and an opening at its inner end communicating with the front section, whereby the water entering the outer end of the hollow bolt will pass through the side openings to the sections, and also through the end opening to the front section, substantially as described.

2. In a hot-water boiler, the combination, with a series of vertical sections cast separate from each other, of hollow bolts or tubes passing transversely through said sections at top and bottom and serving to secure same firmly together, such hollow bolts or tubes having also perforations or openings in communication with each of said vertical sections, diaphragms or checks serving to divide each of said sections into upper and lower compartments or chambers, a coil of pipes for each section in communication with both chambers thereof, and suitable flow-pipes, substantially as and for the purpose specified.

3. The combination, with the vertical sections having the ribs or projections d, of the hollow bolts securing said sections together and having perforations at each side of said ribs or projections, for the purpose set forth.

4. The combination, with the vertical cast sections and with the hollow bolts for securing the same together, of the loose nuts c^4 d^4, contained within the front section, into which the ends of said hollow bolts are screwed, substantially as specified.

5. A cast-section for a hot-water boiler, having the diaphragm or check a^4, with perforation a^5, for the purpose described.

Montreal, May 10, 1889.

JOHN GEORGE SMITH.

Witnesses:

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F. R. CAMERON.