(No Model.)

H. R. MILLER.

HOT WATER HEATING APPARATUS.

No. 556,828. Patented Mar. 24, 1896.

Fig. 1.

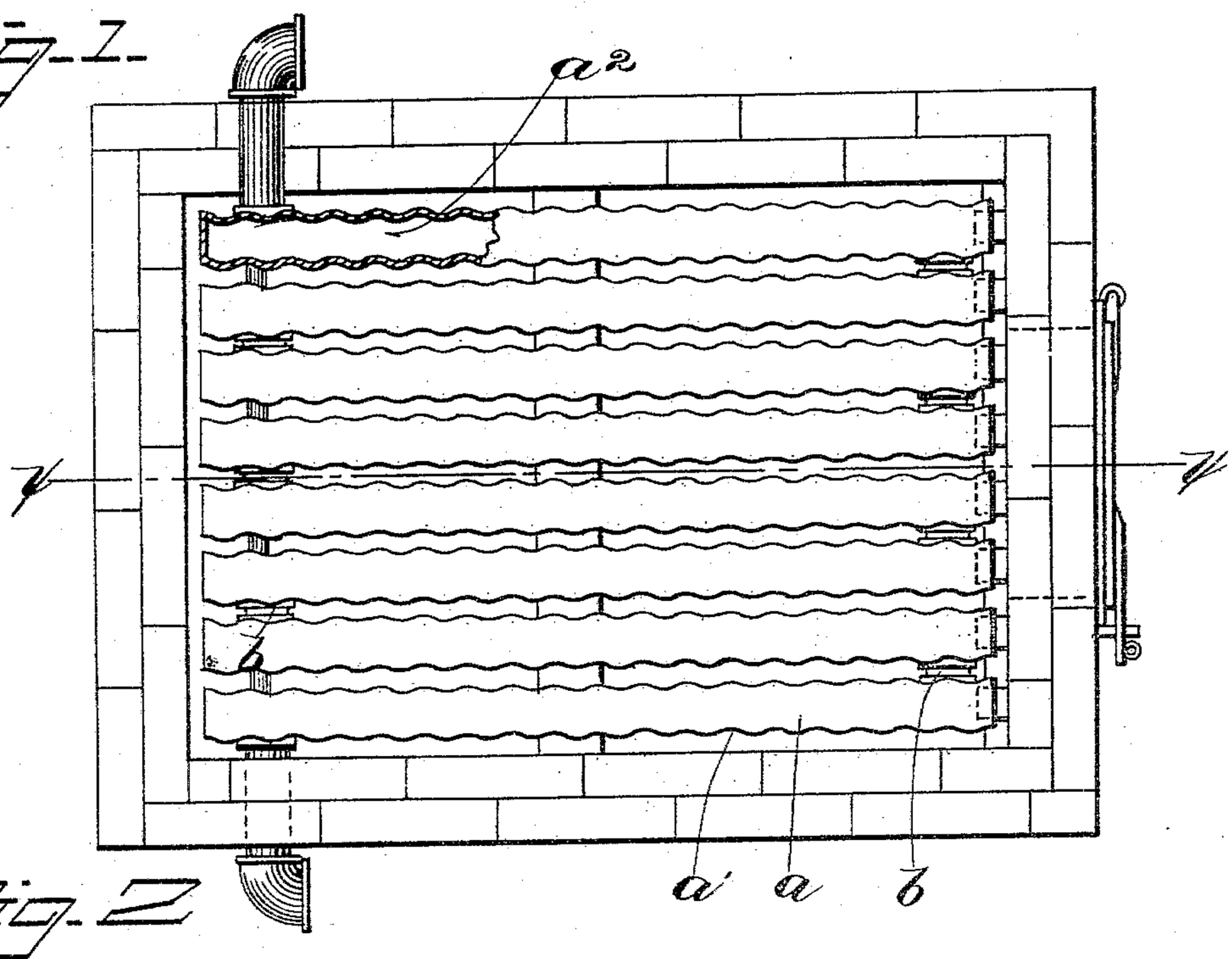
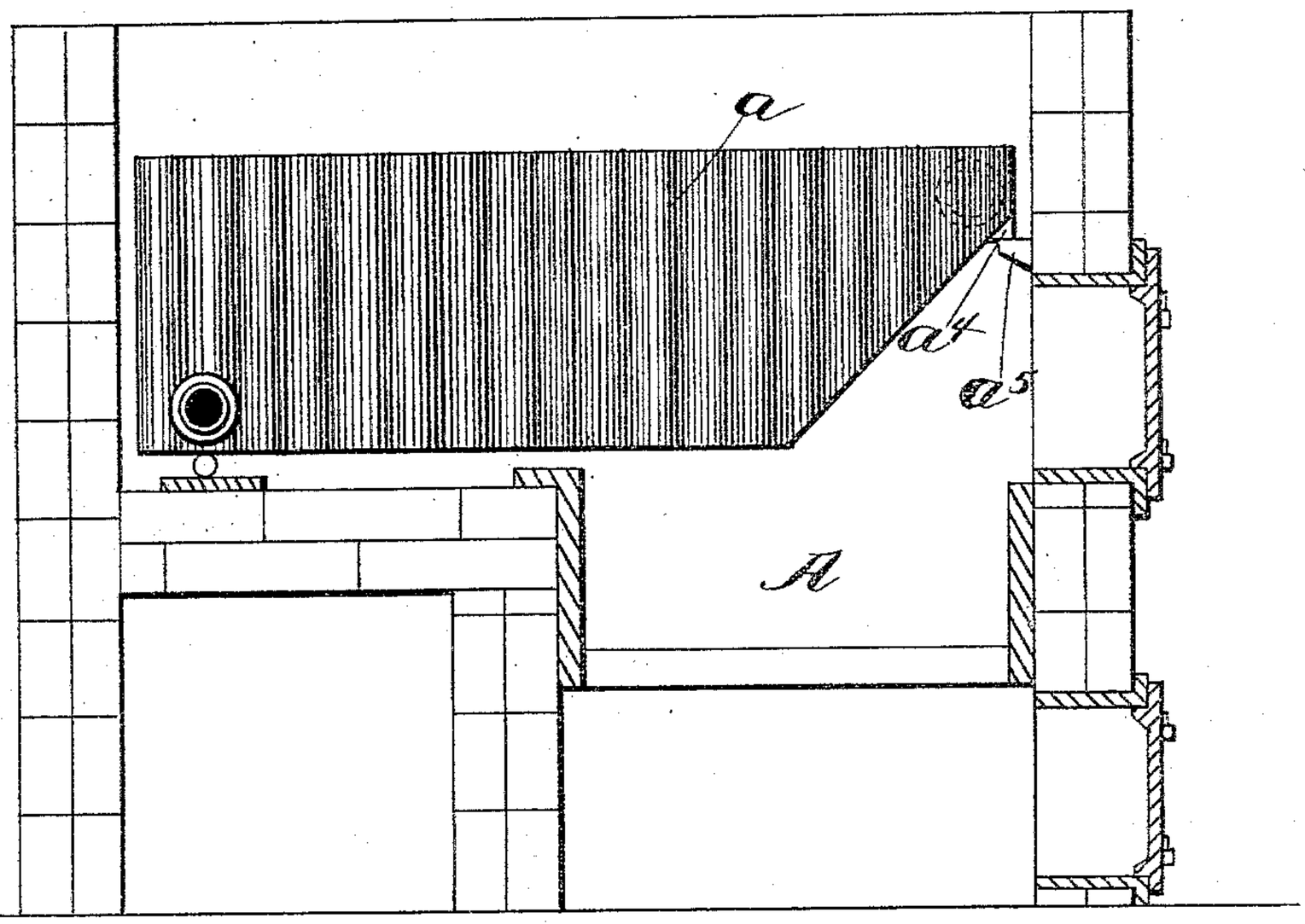


Fig. 2



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UNITED STATES PATENT OFFICE.

HOMER R. MILLER, OF SOUTH FRAMINGHAM, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HERBERT E. MILLER, OF SAME PLACE.

HOT-WATER HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 556,828, dated March 24, 1896.

Application filed July 8, 1895. Serial No. 555,225. (No model.)

To all whom it may concern:

Be it known that I, HOMER R. MILLER, of South Framingham, county of Middlesex, State of Massachusetts, have invented an Improvement in Hot-Water Heating Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve the construction of hot-water heating apparatuses.

In accordance with this invention several thin water-receivers are placed in vertical position side by side quite near together and connected in series, and the set of water-receivers so constructed are provided with an inlet and an outlet connection or pipe. These thin water-receivers are each preferably made as a single or one piece casting, and their opposite sides are formed with vertical corrugations which augment the heating-surface and form flues or passage-ways for the products of combustion which pass up between the receivers. Interiorly these thin water-receivers are formed with an undulating or tortuous passage therethrough from end to end which retards the progress or flow of the water. This tortuous passage may and preferably will be formed in parallelism with the exterior corrugations, and in addition to retarding the circulation at such point provides as much exposed water-surface as fire-surface. Supports are provided for the front and rear ends of these thin water-receivers, and by means of the intermediate connections by which they are connected in series are securely held in vertical position on their supports. The lower front end of these thin water-receivers are formed more or less obliquely to present an unobstructed passage to the fire-pot above which they are placed.

Figure 1 shows in plan view and partial section a hot-water heating apparatus embodying my invention, and Fig. 2 a side elevation of the same.

The thin water-receivers *a*, six being herein shown, are or may be made as a one-piece casting of any suitable length and height, but very thin. Exteriorly their opposite sides are preferably formed with transverse or vertical corrugations *a'*, which may be made in parallelism, if desired. Interiorly the passage a^2 is formed more or less undulating or tortuous—as, for instance, it may be formed in parallelism with the exterior corrugations. These thin water-receivers *a* are placed in vertical position side by side and close together, there being sufficient space between them for the passage of the products of combustion, and they are connected together in series by short intermediate connections 2—that is to say, the upper front end of one receiver is connected to the upper front end of the one next to it, and the lower rear end of this latter receiver is connected to the lower rear end of the next receiver, and so on, thereby providing a continuous passage for the flow of water through the entire set of receivers. To one of the outside receivers of the set an inlet-pipe is connected, and to the other outside receiver an outlet-pipe is connected, said pipes being connected in circuit with the circulatory system.

The front ends of the water-receivers have formed upon them suitable lugs a^4, which rest on supports a^5 secured in the masonry, and thereby supporting the front ends of the receivers, and the rear ends thereof rest upon rollers or other suitable supports which may be provided for them.

The lower front end of the receivers are formed obliquely, as shown in Fig. 2, so as to present an unobstructed passage through the fire-pot A.

The set of thin water-receivers *a* are placed just above the fire-pot, or between it and the outlet for the products of combustion, and the exterior corrugations form vertical flues or passages for the products of combustion, in addition to providing greater heating-surface, while the interior undulating or tortuous passage retards the flow of water through the set of receivers that it may be heated to a greater temperature.

I claim—

1. In a water-heating apparatus, the thin water-receivers *a* arranged side by side, and connected together in series as described, the connections at one end being near the top

and at the opposite end near the bottom, and the inlet and outlet connections, substantially as described.

2. In a water-heating apparatus, the thin water-receivers *a* arranged side by side, short intermediate connections 2 connecting one end of one receiver to the corresponding end of the next one, and connecting the opposite end of this latter receiver to the corresponding end of the next one, and so on as shown, the connections at one end of the receiver being near the top and at the opposite end near the bottom, and the inlet and outlet connections, substantially as described.

3. In a water-heating apparatus, the thin water-receivers *a*, having their interior passage a^2 formed with corrugated sides, arranged in parallelism and at an angle to the course of the water therethrough, to thereby provide an undulating passage for the water, of the same width from end to end, and the inlet and outlet connections, substantially as described.

4. In a water-heating apparatus, the thin water-receivers *a*, arranged side by side, connected together in series, having their exterior sides corrugated vertically and in parallelism, and their interior corrugated in parallelism with said exterior corrugations, and the inlet and outlet connections, substantially as described.

5. In a water-heating apparatus, the water-receivers *a*, arranged side by side, connected together in series as described, having lugs at their forward ends resting on supports secured in the masonry, and their back ends supported on rollers, and the inlet and outlet connections, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOMER R. MILLER.

Witnesses:
FRED L. OAKS,
HERBERT E. MILLER.