(No Model.) 2 Sheets—Sheet 1.

F. JAKEL.

WATER HEATER.

No. 504,587. Patented Sept. 5, 1893.

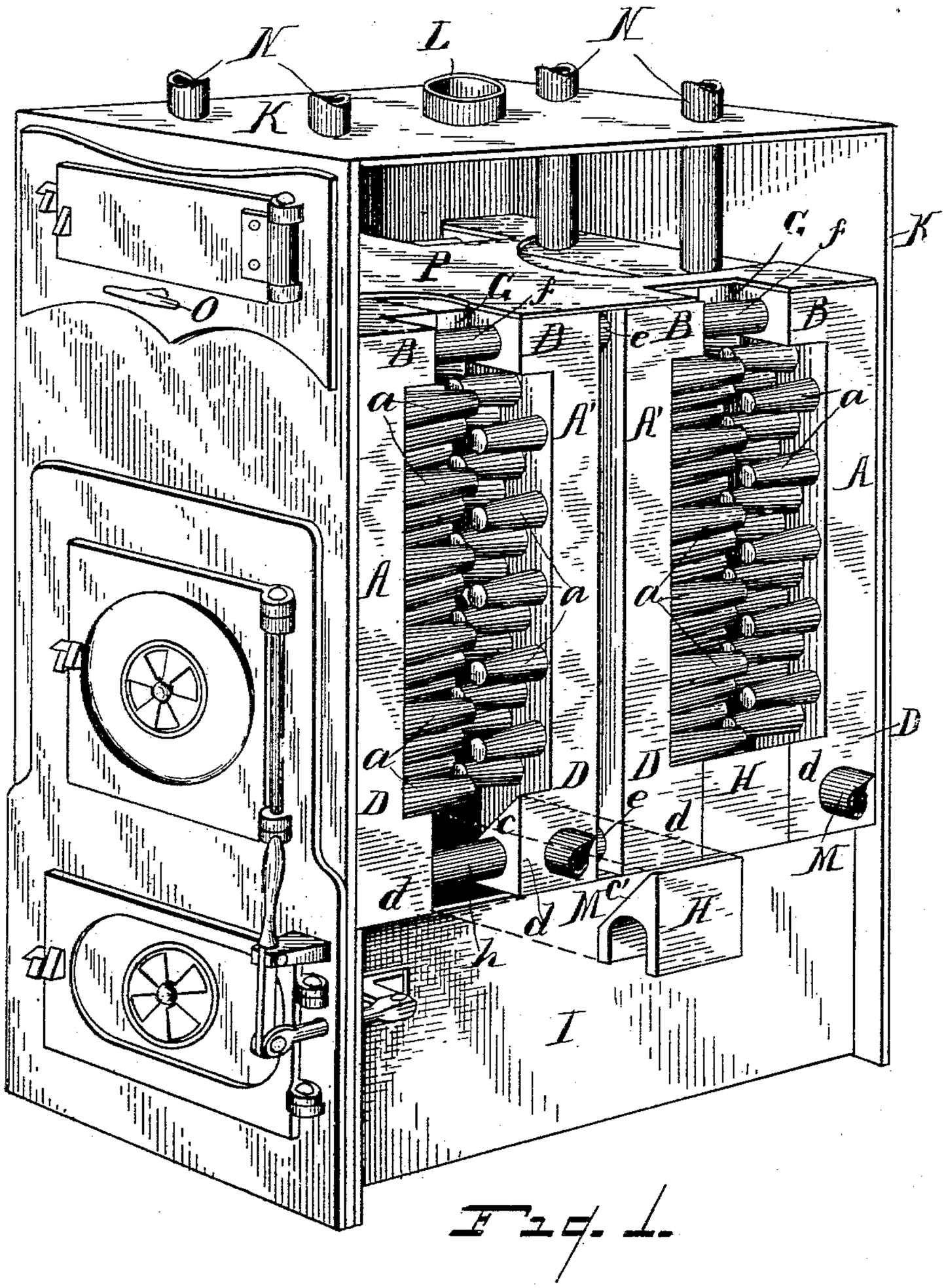

Fig. 1.

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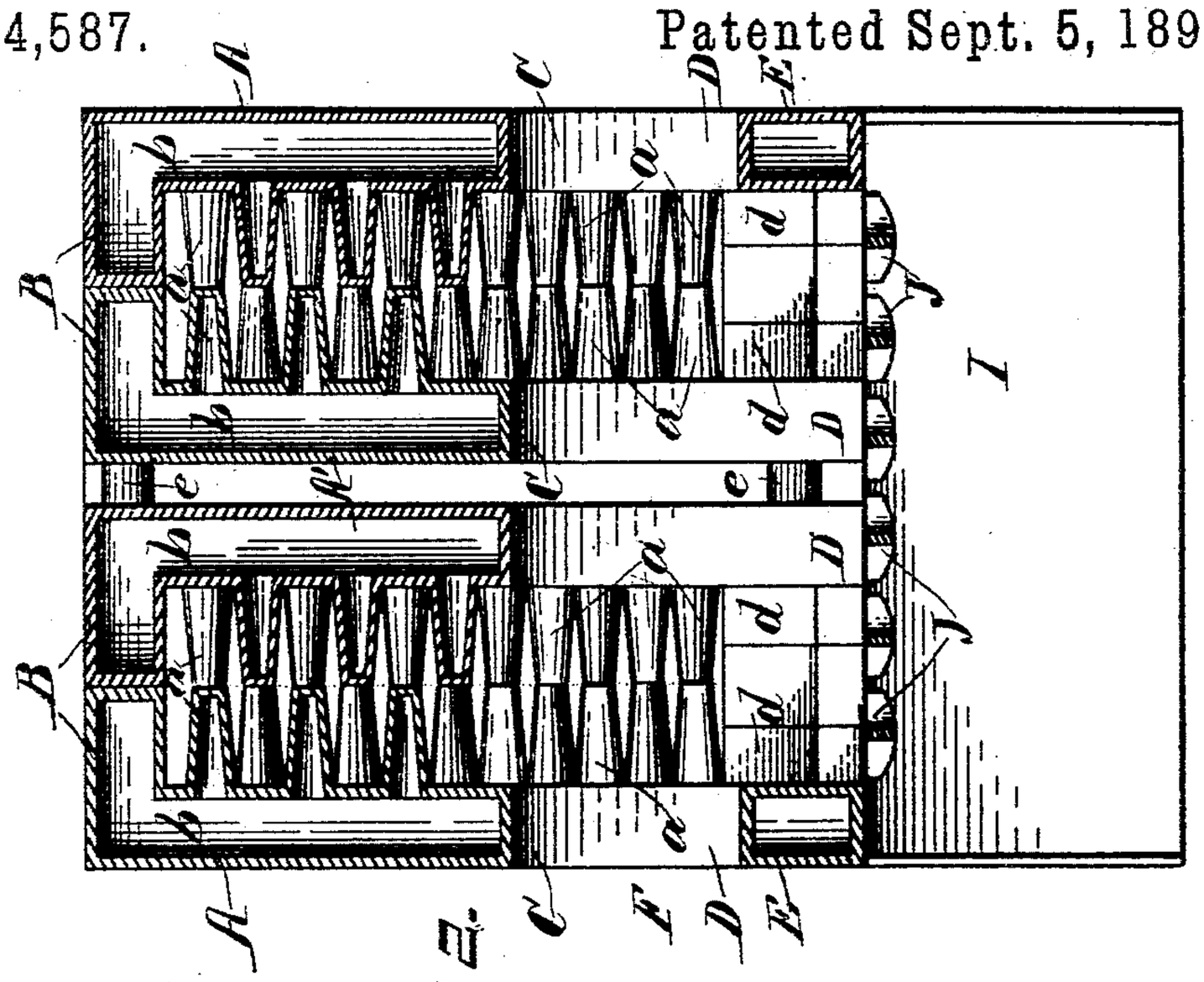

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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FERDINAND JAKEL, OF DETROIT, MICHIGAN.

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 504,587, dated September 5, 1893.

Application filed June 24, 1892. Serial No. 437,834. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND JAKEL, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Water-Heaters; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in water-heaters, especially designed for heating water for a hot-water circulating system; and consists in a certain construction and arrangement of parts as hereinafter fully set forth, the essential features of which being pointed out particularly in the claims.

The object of the invention is to produce a heater that may be cheaply constructed, in which a great area of heating surface is obtained without undue obstruction to the draft, and in which the construction is such as to maintain the water in active circulation and render the heater self-draining. This object is attained by the device illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of my improved heater, the casing at one side being removed, showing arrangement of parts. Fig. 2 is a central vertical section through the heater. Fig. 3 is an elevation of one of the sections thereof. Fig. 4 is a plan view of the heater, showing the damper construction.

The heater is composed of a plurality of hollow rectangular cast sections A and A′, which are provided with a series of horizontal, alternating tubes *a*, extending from one of the vertical faces of said sections. Said tubes are slightly conical, being the smaller in diameter at their outer ends, and the interior thereof communicates with the water-space *b* in the hollow section on which they are formed, as clearly shown in Fig. 2. Each of said sections is provided at the top with a hollow cap portion B, extending at right-angle thereto and in vertical line with the tubes *a*, the interior of said cap-portion also communicating with the water-space *b* in its respective section. In the base of each of said sections is formed an arch C, having the hollow columns or legs D, the legs of the sections A being coupled by the hollow transverse cross-over or connecting base-section E, which at the front of the heater forms the sill of the stoke hole F, as shown at the left of Fig. 2. Formed at the base of said legs, and projecting at right-angle thereto in vertical line with the tubes and cap-portion, are hollow extensions *d*, which form the sides of the fire-pot when said sections are assembled, the inner faces of said extensions being inclined at *c* to prevent the collection of fuel or ashes thereon. These sections are arranged in pairs vertically parallel, with their tube bearing faces adjacent, as shown in Figs. 1 and 2, the arrangement being such that the cap-portions meet at the top, and the tubes *a* extend inward from each section, their ends terminating at the center between the sections and alternating with one another. The corners of the extended cap portions are cut away, so that when the sections are placed together, a draft opening G is formed through the caps at each side thereof, said openings also affording means for the introduction of the connecting nipples *f*, whereby the sections are securely coupled, at the top, and communication is established between their hollow cap portions, the base of said sections being coupled by the nipples *h* connecting their hollow extensions *d*. Located in the space between said extensions *d*, is a removable block H, having a recess in its under face, that receives the nipple *h* over which it is adapted to fit, and also having the inner inclined face *c′* which coincides with the incline of the face of the extension *d*, and forms the complementary wall of the fire-pot between said extensions. This removable block or section affords ready access to the connecting nipple *h* and also protects said nipple from the direct action of the fire. The inner sections A′ are located a slight distance apart so that their adjacent vertical faces may be employed as heating surfaces, and are connected at the top and bottom by means of the interposed nipples *e*, whereby all of the sections of the heater are placed in communication, enabling a perfect circulation to be maintained therethrough.

The heaters may be formed of any number of these hollow sections, which are assembled in the manner shown in Figs. 1 and 2, the arches in said sections forming the fire-space, above which the horizontal tubes of the opposed sections meet, the legs or columns of the arches resting upon a suitable base I, which forms the ash-pit, and at the top of which is located a grate J, and the whole being inclosed by a suitable casing K, the front of which is provided with the usual doors communicating with the fire-space and ash-pit. This casing may be formed of brick, if desired, and is placed closely about the heater, except at the top, when a space is left above the cap of the heater, with which the smoke flue L communicates, which passes through the top of the casing K. Connected with the base of the hollow sections, are the return pipes M, and leading from the hollow cap of said sections, are the hot-feed pipes N, all of which pipes being in communication with the circulatory system.

Located on the top of the cap is a plate P, which is adapted to slide horizontally, and serves as a damper to control the draft-openings G, in said cap, said damper being actuated by means of the handle O.

It will now be apparent, that, in a heater of this construction, the fire is entirely surrounded by the water-space in the hollow sections, in which the water stands in a thin sheet or column enabling it to heat readily, and that by means of the horizontally extending tubes, great additional heating surface is secured, and the water being separated into small divisions in said tubes is quickly acted upon by the intense heat in the combustion chamber, into which they extend from opposite directions and are so arranged, that, while the full effect of the caloric current is utilized, in passing therethrough, the draft is not thereby obstructed. These tubes instead of being cast integral, may be threaded and screwed into tapped apertures in said sections, but the cast form is preferred as it is less expensive, and enables the heater to be very cheaply constructed. The conical formation of said tubes enables every part of the water space in the heater to be perfectly drained.

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

1. A water-heater comprising a hollow cast section having a water-space therein, and provided with conical, laterally extending tubes formed integral with said section that communicate with said water-space said section having also the arched base forming the fire-space therein.

2. In a water heater, the opposed hollow sections, said sections having the right angle hollow cap portions, and the hollow lateral extensions at the base forming the sides of the fire-pot, the tubes coupling the adjacent cap portions, and the base extensions of the respective sections, substantially as specified.

3. A plurality of hollow rectangular sections in communication and arranged approximately parallel, said sections having arches in their base which form the fire-pot, the tubes projecting into the fire-space from the opposed faces of said sections and located around and above said arches.

4. A plurality of hollow sections having arches in the base thereof forming the fire-pot, and provided with the hollow extensions at the base that form the walls of said pot, the tubes extending from the opposed faces of said sections above the fire-pot, and the nipples coupling said sections.

5. In a heater, a plurality of hollow sections all in communication, said sections having the arches at their base which form the fire-space, the horizontal tubes extending from the opposed faces of the sections above the fire-space, the hollow cap of said sections, said cap having the draft openings therein, and the horizontally movable damper adapted to control said openings.

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

FERDINAND JAKEL.

Witnesses:
H. R. WHEELER,
E. S WHEELER.