

(No Model.)

2 Sheets—Sheet 1.

J. MEATHE.
CIRCULATING WATER HEATER.

No. 403,545.

Patented May 21, 1889.

Fig. 1.

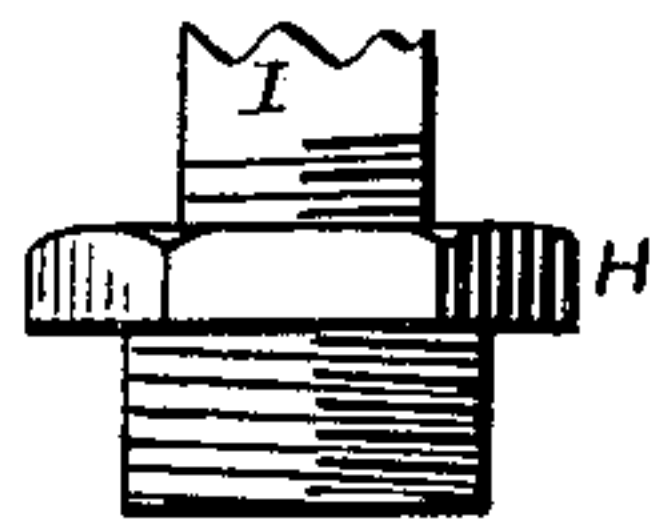
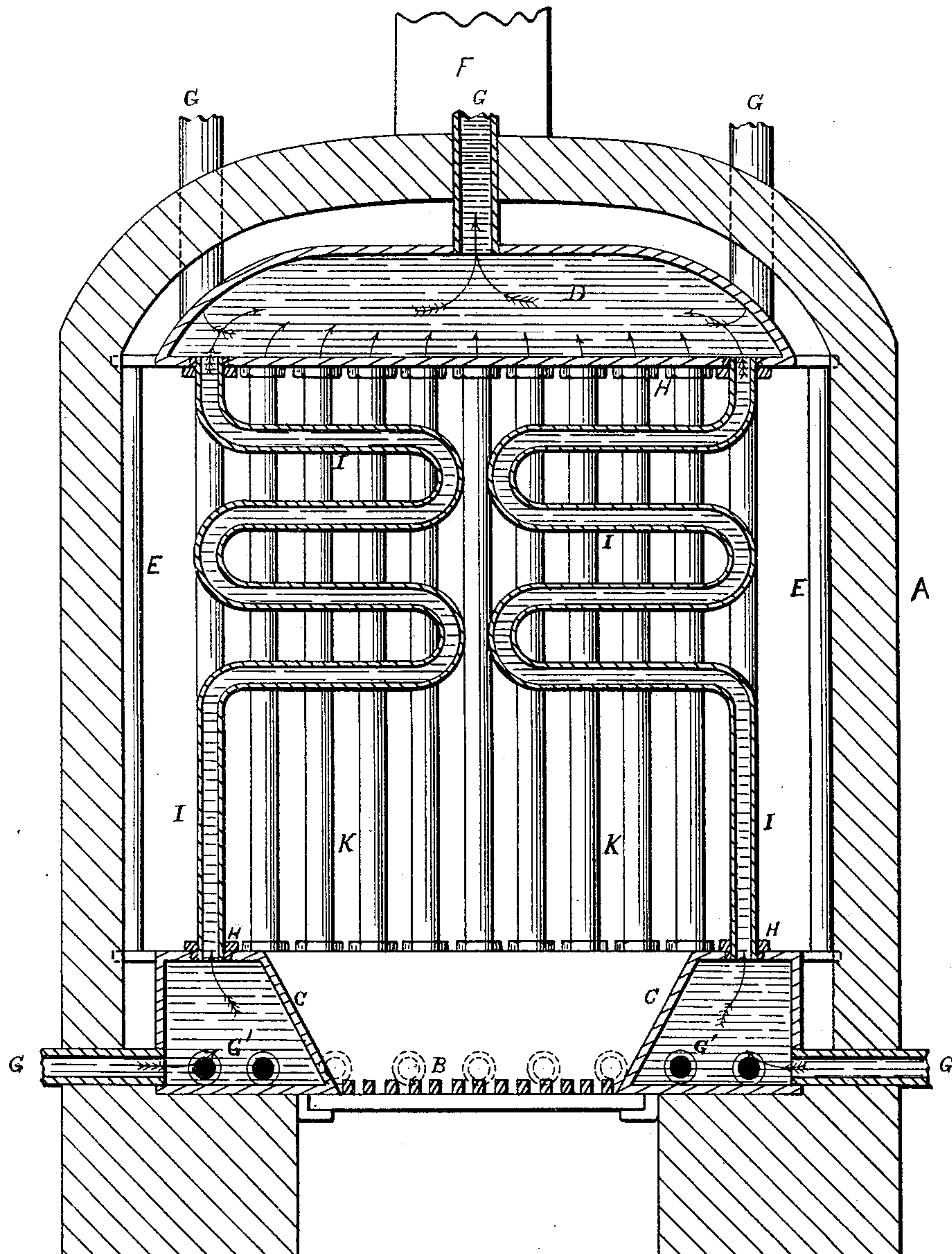


Fig. 2.

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John E. Miles.
Kate Jarvis.

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by
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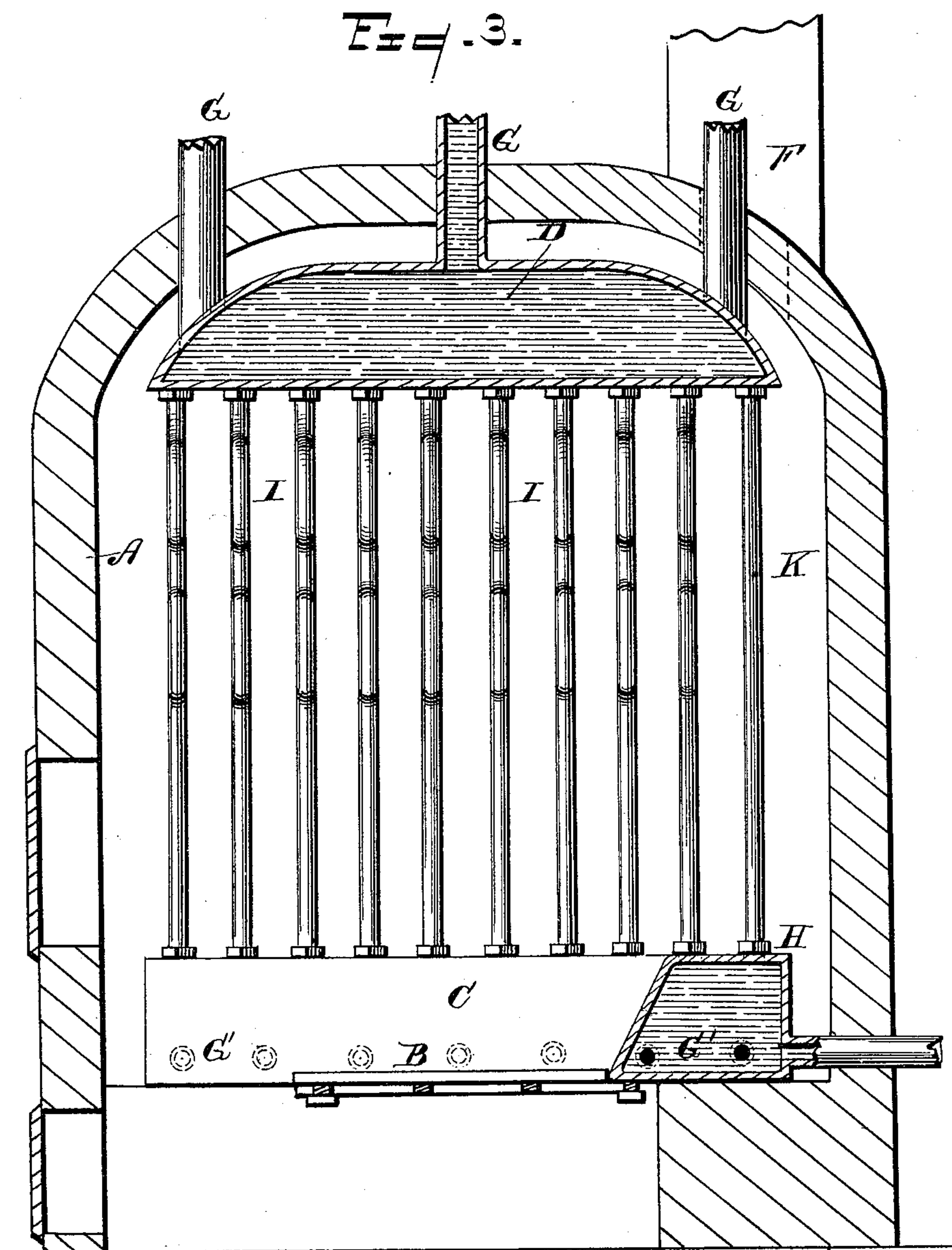
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2 Sheets—Sheet 2.

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WITNESSES,
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UNITED STATES PATENT OFFICE.

JAMES MEATHE, OF DETROIT, MICHIGAN.

CIRCULATING-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 403,545, dated May 21, 1889.

Application filed December 15, 1888. Serial No. 293,753. (No model.)

To all whom it may concern:

Be it known that I, JAMES MEATHE, of Detroit, county of Wayne, and State of Michigan, have invented new and useful Improvements in Circulating-Hot-Water Heaters, of which the following is a specification.

My invention relates to that class of heaters employed in warming houses in which a system of pipes are carried through the different parts of a building and connected at each end with water-chambers in a furnace in such manner that a continuous circulation of hot water will be maintained from the heater through the pipes into the radiators, and thence back to the heater.

In the annexed drawings, making a part of this specification, Figure 1 is a vertical section transversely through the furnace, and Fig. 2 is an elevation showing the coupling device by which the hot-water tubes are connected to the upper and lower chambers of the heater in the furnace. Fig. 3 is a vertical central section through Fig. 1.

The same letters are used in all the figures in the indication of identical parts.

A is the brick wall of the furnace, built in the usual manner, with a fire-grate, B, at the bottom of the fire-chamber. This fire-grate is surrounded on three sides (or entirely, if preferred) by the hot-water-chamber C.

D is another chamber supported upon the rods E, which extend from flanges on C to flanges on D, and straight tubes K, supporting the latter, so that the heat from the incandescent fuel may circulate freely around the tubes, the whole of D and part of C, and escape upward through the uptake F.

G are hot-water tubes opening out of the hot-water chamber D, and thence carried through the apartments and through the radiators, and thence extended by other tubes back to the lower chamber, C, of the heater at G'.

In the construction of heating apparatuses of this class it is desirable to attain, first, a maximum exposure of the parts containing the water to the action of the fire; second, to provide for the connection of the tubes in such manner that they may be conveniently placed or removed, and, third, that the number of joints shall be reduced to a minimum. It is

to the attainment of these ends that my invention is directed.

I I I are tubes, of wrought-iron or other suitable material, connecting the upper and lower chambers, C and D. These tubes are straight at the lower end and then bent inwardly to near the middle of the fire-box at a sufficient height above the grate-bars to afford sufficient room for the fuel. They are then bent by a return-curve and again and again bent so as to form a series of curves like those of the printed letter "S," which I shall herein designate as loops. The entire pipe lies in the same vertical plane, and the loops cross the path of the ascending products of combustion several times, and the upper end of the tube, where it enters the upper chamber, D, is directly above the lower end where it connects with the chamber C. A row of such tubes is formed on each side by placing them side by side, with the loops of each extending inwardly over the fire, and at a sufficient distance apart to afford a free circulation around the tubes for the ascending draft. These tubes are homogeneous—that is to say, they are continuous tubes of one material, thus avoiding the usual joints and the use of different materials, such as cast and wrought iron, the effect of which is found to be mischievous. This, together with the formation of the tube into loops, makes them free to expand or contract without straining and consequent leakage. They are connected with the upper and lower plates of the chambers C and D by means of right and left couplings H. These are sleeves formed on the inside and outside with a male and female screw—one right and the other left—by which they are connected with the plates of the chamber and the tubes I. As the loops of the tubes I make them elastic to some degree, one end of the tube may be attached by these couplings to, say, the bottom plate of the upper chamber, and then the tube may be sprung sufficiently to introduce its lower end into the upper end of the lower coupling, H, placed on the threaded hole in the upper plate of the lower chamber, C, by turning which coupling the tube will be drawn into the coupling and the coupling into the plate, thereby forming a close joint, not

liable to leakage, and making it very easy to remove any defective tube.

K K are another series of tubes extending between chambers C and D at the rear of the fire-chamber. These tubes K K, being straight, sustain the weight of the rear end of the chamber D, while the rods E sustain the front end, thereby relieving the tubes I, which, by reason of their being bent into loops, are illy fitted to sustain a heavy weight.

Instead of rods E, tubes may be used for the same purpose and also to increase the circulation.

The circulation-tubes may be supplied with the usual valves for regulating the circulation of the water.

The apparatus is operated in the usual manner, being entirely filled with water, which is caused to circulate by means of the heat applied in the furnace. The arrangement which I have shown is recommended by its simplicity and cheapness of construction.

I do not wish to limit myself to any particular number of loops nor to the exact form herein represented. It is, however, important that the curves shall lie in one plane, so as to avoid waste of room, and that the tubes shall be placed in parallel planes for the same reason.

I have represented the upper and lower chambers as being entirely separate, except as connected by the tubes. The tubes I may, however, be used in combination with a water-jacket which extends down the sides of the fire-box. It is, however, essential that the connection shall be made below and above, and the return-water, brought back from the circuit reduced in temperature, shall be introduced at the bottom, so that it may flow into the tubes I and be exposed to the fire, in order that the circulation may be maintained. So, also, instead of supporting the rear end of chamber D on the tubes K, it may be supported upon rods or posts, as in front, such rods or posts being in that case equivalents of the tubes K, so far as their function of support is concerned.

I am aware that in water-heaters and steam-boilers tubes crossing the fire-box or draft-passages have been employed, and my claim is therefore limited to the combination of elements by which I am able to produce better effects, or the same effects more cheaply; and

my invention is distinguished from what has been before known, mainly, in the construction of the tubes I with a portion extending some distance upwardly along the side of the fire-box when they are bent, so as to extend horizontally to or nearly to the middle of the fire-box, when they are again bent in serpentine loops kept in the same plane and terminating in the lower plate of the upper chamber or crown-sheet of the fire-box. By this construction the pipes may be arranged side by side in parallel planes on each side of the fire-box, and as close together as will admit of the requisite free circulation of the gaseous products of combustion between and around the pipes. This form leaves the space above the grate-bars for the free combustion of the fuel, and permits the use of nearly or quite twice as many pipes as can be employed in those cases in which tubes are made to cross the fire-box entirely from opposite sides alternately. The tubes I being all similarly formed have spaces between them in horizontal planes, which permit the top of the loops to be cleared of ashes, which would diminish the transmission of heat—a serious objection to those tubular boilers in which the bent tubes have their loops in different planes and so filling the fire-box as to make access to the loops difficult, if not impossible.

What I claim as my invention, and desire to secure by Letters Patent, is—

In combination with a lower water-chamber, C, inclosing the fire-grate, an upper water-chamber, D, supported thereon by tubes or rods E K, a double series of identical and homogeneous tubes, I, also connecting said chambers, arranged on opposite sides of the fire-box with corresponding parts thereof in parallel, vertical, and horizontal planes with intervening spaces, and return circulation-tubes G, said heating-chambers and tubes being connected in such manner as to permit the exposure of their entire surfaces above the base to the action of the heat, substantially as and for the purpose set forth.

In testimony whereof I have hereunto affixed my name in the presence of two subscribing witnesses.

JAMES MEATHE.

In presence of—

R. MASON,
KATE JARVIS.