

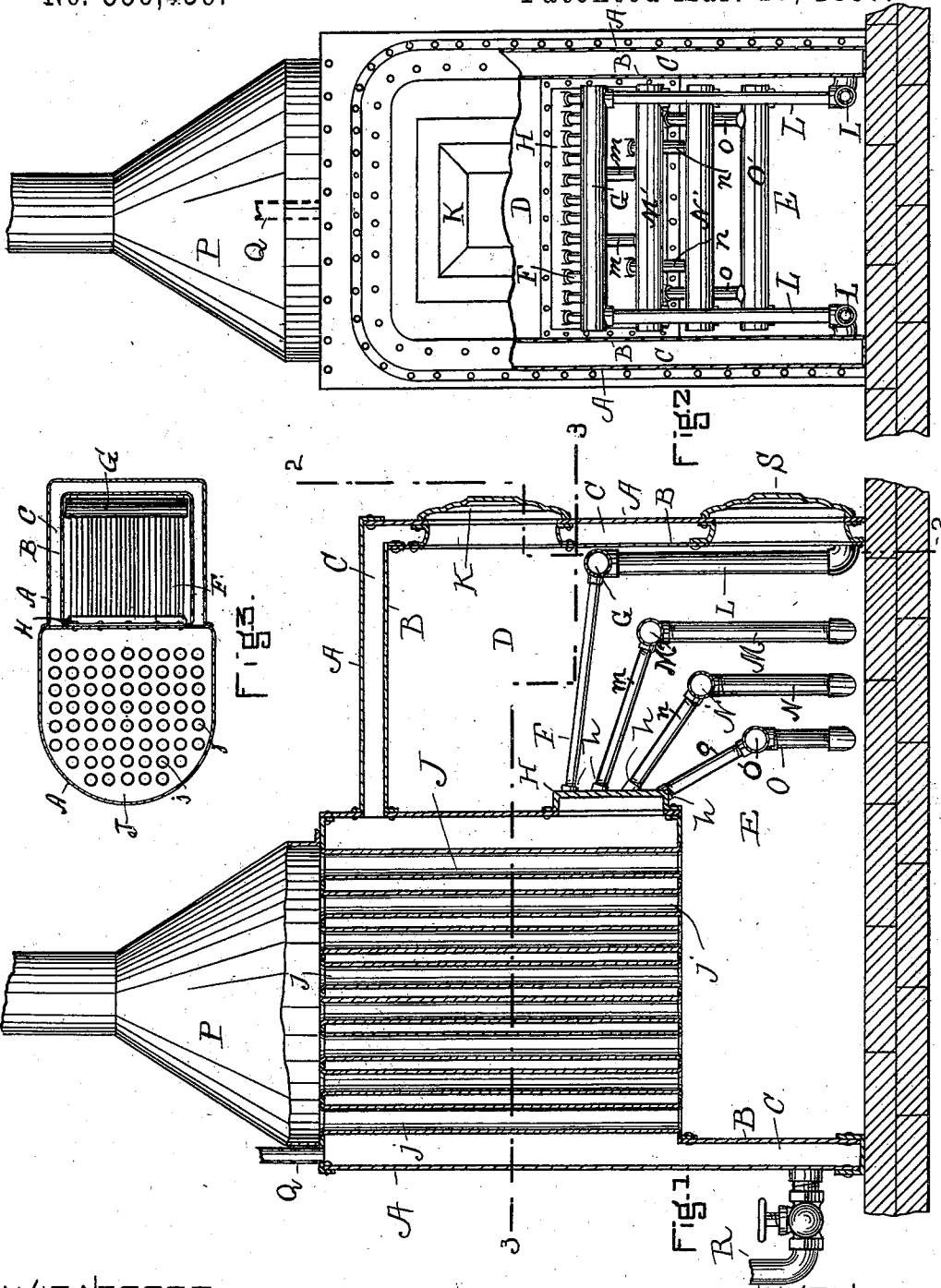
(No Model.)

H. DE W. SAWYER & W. H. COLCORD.

HEATING APPARATUS.

No. 556,439.

Patented Mar. 17, 1896.



WITNESSES.

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# UNITED STATES PATENT OFFICE.

HOWARD DE WOLFE SAWYER AND WILLIAM H. COLCORD, OF REVERE, MASSACHUSETTS; SAID SAWYER ASSIGNOR OF PART OF HIS RIGHT AND SAID COLCORD ASSIGNOR TO DANIEL W. WORMWOOD, OF CHELSEA, MASSACHUSETTS.

## HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 556,439, dated March 17, 1896.

Application filed July 5, 1895. Serial No. 554,953. (No model.)

*To all whom it may concern:*

Be it known that we, HOWARD DE WOLFE SAWYER and WILLIAM H. COLCORD, of Revere, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Heating Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention is an improvement in the class of heating apparatus known as "house-heaters" operating by hot-water or steam circulation, and the peculiarity which characterizes this heater is that the draft is downward between water-containing side walls through the hollow grate on which the fuel rests and among a succession of water-tubes arranged below the grate in the path of the heated current, which afterward passes upwardly through flues in the vertical boiler and escapes through the funnel. The grate-tubes and those subjacent to the grate enter at different angles into a transverse breast or water-way extending across the front of the boiler and bolted or otherwise attached thereto. All these tubes slope upwardly to insure proper circulation of the water as it becomes heated, and through them all water passes from the front or side walls of the combustion-chamber across the path of the intense caloric current to the lower portion of the upright boiler. The arrangement of parts is such that the water is exposed to the heat in the most effective manner and is rapidly heated to the extent desired. Flow-pipes lead from the upper part of the boiler to radiators in the rooms to be heated, and return-pipes extend thence to the lower part of the boiler or its water-wall for repeated circulation. The fuel-door above the grate constitutes the draft-inlet, which may be regulated at will to control combustion. Smoke is consumed in its passage with gases and light particles of carbon through the body of incandescent fuel on the grate. The bottom of the heater is preferably open for more convenient repairs, and the apparatus will stand on a fire-brick or other intractible base.

In the drawings, Figure 1 is a vertical sec-

tion of a house-heater embodying our invention. Fig. 2 is a front view of the same, part of the front wall being broken away on line 2 2 of Fig. 1 to show interior parts. Fig. 3 is a horizontal section taken on line 3 3 of Fig. 1.

A represents the exterior and B the interior wall of the heater-body, between which is the water-space C. This hollow water-wall incloses the fuel-chamber D and combustion-chamber or ash-pit E, except at the bottom, which is preferably left open for convenient access to the interior during construction and repairs.

The apparatus will be set on a fire-brick or like intractible foundation.

F represents the hollow grate, formed of parallel water-tubes extending from a horizontal water box or tube G at the front of the heater to and into a hollow breast H, securely bolted or otherwise attached to the front or bottom of the upright boiler J, which is located in rear of the fuel-chamber D and over the rear portion of the ash-pit E.

K is the fuel-door, through which fuel is supplied to the grate F. This door also forms the draft-inlet, air being thus supplied above the grate and fuel, so that the draft is downward through them, thereby consuming smoke, gases, and fine particles of carbon in such downward movement or immediately thereafter in the combustion-chamber, where intense heat is developed.

The tube or water-box G, with which the front ends of the grate-tubes communicate, is supplied with water from the front or side walls of the heater through upright supply-pipes L, which rise from the lower part of said walls to insure an upward current as the water becomes heated. This connection also allows for the slight yielding required by the expansion and contraction of the grate-tubes.

We introduce supplementary heating and circulation pipes below the grate and within the combustion-chamber, such pipes M N O rising from the lower part of the side walls, extending horizontally across the path of the caloric current, as at M' N' O', and entering the breast H in an oblique direction through

bosses *h* formed thereon to receive the tubes *m n o* at the varying angles required by their several positions. (See Fig. 1.) These circulation and heating pipes will be of any desired diameter where they are coupled to the lower part of the side wall, and they rise thence and run horizontally across the fire-pot, exposing broad surfaces to the heat with a relatively slow movement through them. The horizontal pipes *M N O* are free, endwise, from engagement with the side walls. Their diameter may be reduced where they enter the breast *H*, so as not to weaken it unduly; and it will be understood that here the movement of the water will be more rapid. The horizontal connecting-pipes *M' N' O'* may be continuous from side to side of the heater-body, as in Fig. 2, or they may be severed centrally and run from each side nearly to the center, thence by the oblique pipes *m n o* entering the breast *H*. The upright boiler *J* is filled with water, and has a multiplicity of vertical flues *j* extending through it so as to give free passage to the caloric current upwardly to the tapering cap and funnel *P*. The bottom of the boiler is exposed to the direct heat of the combustion-chamber, and the construction shown causes an upward movement and proper circulation to the water within the boiler, which is in open communication with that in the hollow walls *C*.

Flow-pipes *Q* lead to radiators in the rooms to be heated, and return-pipes *R* bring the water again to the lower part of the heater, so that a constant circulation is maintained.

Water is introduced when required at any convenient point. An ash-door *S* is provided for removal of ashes from time to time.

We claim as our invention—

1. In a downdraft heating apparatus, the upright boiler or water-back *J* having vertical flues extending through it and the protruding breast *H* having a series of nipples *h* threaded to receive water-tubes at different angles, in combination with the water-grate *F* and the subjacent heating and circulation pipes extending in an indirect line from said breast to the water-containing walls of the combustion-chamber, substantially as set forth.

2. In a downdraft heating apparatus, the hollow-walled body comprising fire-chamber and ash-pit and the upright boiler or water-back communicating internally therewith, in combination with the water-grate *F* and a succession of heating and circulation pipes extending across the path of the caloric current, below the grate, such grate and pipes connecting in rear with said boiler or water-back and in front with the hollow walls of the body and adapted to yield as required by expansion and contraction of the grate, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HOWARD DE WOLFE SAWYER.  
WILLIAM H. COLCORD.

Witnesses:

A. H. SPENCER,  
EDWARD S. BEACH.