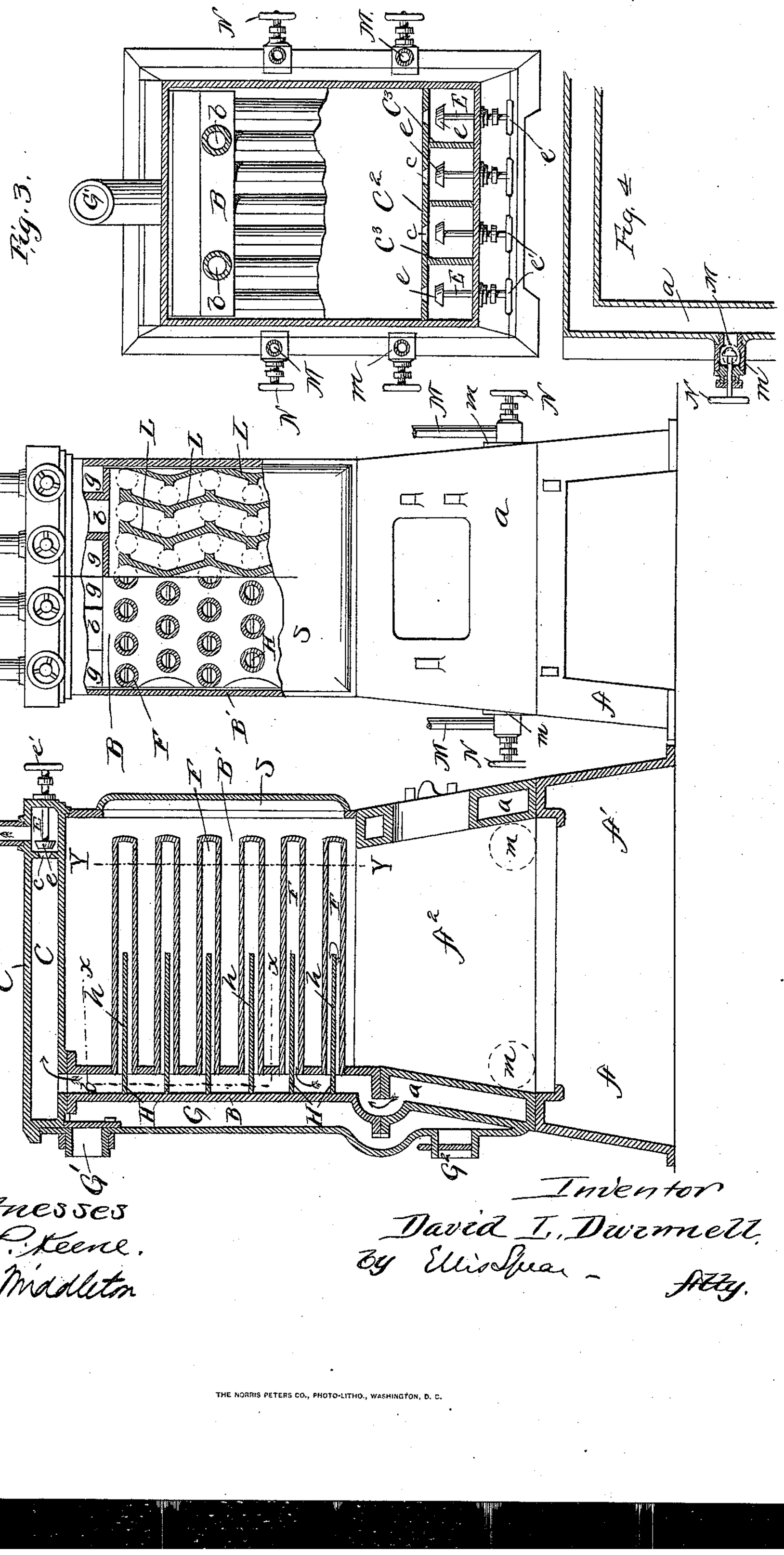
(No Model.)

# D. L. DWINNELL.

## HOT WATER BOILER.

No. 442,701. Patented Dec. 16, 1890.

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# UNITED STATES PATENT OFFICE.

DAVID LANCASTER DWINNELL, OF MONTREAL, CANADA, ASSIGNOR OF ONE-HALF TO GEORGE ANGUS MILLER AND CHARLES HERBERT MILLER, BOTH OF SAME PLACE.

## HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 442,701, dated December 16, 1890.

Application filed April 5, 1890. Serial No. 346,642. (No model.) Patented in Canada March 13, 1888, No. 28,684.

*To all whom it may concern:*

Be it known that I, DAVID LANCASTER DWINNELL, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Hot-Water Boilers, (for which I obtained a patent in Canada, No. 28,684, dated March 13, 1888;) and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to that class of boilers or heating-furnaces generally used in connection with a system of hot-water pipes and coils, or pipes and radiators, used for warming buildings, and has for its object to produce a boiler or furnace which shall be simple and economical in construction and at the same time afford the maximum amount of heating-surface and improve the circulation.

The invention may be briefly described as the embodiment in a hot-water boiler or furnace of the usual ash, fire, and heating chambers, a water back or chamber, a series of horizontal pipes arranged in rows in the heating-chamber above the fire in such manner that each will dodge the other, and thus allow the products of combustion to pass upward freely between them, such pipes being in connection with said water-back at their inner ends and stopped at their outer ends. The fire-chamber is surrounded by a water-chamber which is the continuation of the water-back, and the upper part of this water-back opens into a compartment extended across the top of the furnace and from which the flow-pipes lead.

Certain details of construction and novel combinations of parts are also included in my invention, for full comprehension of which 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 represents a transverse vertical section of my boiler or furnace; Fig. 2, a front view with the upper half of cleaning-door S broken away and parts in section taken on the lines X X and Y Y, Fig. 1; and Fig. 3, a plan view with part of the top broken away. Fig. 4 is a detail sectional view of one of the valves for controlling the openings between the return-pipes and the water-back.

A is the base of the furnace, cast in one or more pieces, and including the ash-pit A′ and fire-chamber $A^2$, *a* being the water-jacket surrounding the fire-chamber and in communication with a water-back B, which forms the rear wall of the heating-chamber B′, which is also, by preference, of cast-iron and superimposed upon the fire-pot $A^2$ and bolted thereto.

Above the heating-chamber and communicating with the water-back, preferably by two openings *b b*, is a chamber C, formed within the top casting C′, which chamber extends from side to side of the furnace and practically from front to back, having, however, by preference, a portion of its area cut off near the front by a transverse diaphragm $C^2$, and this portion is subdivided by diaphragms $C^3$ $C^3$ into the same number of chambers as there are flow-pipes D, one of which leads out of each of the chambers so formed. The diaphragm $C^2$ is perforated opposite each of these small chambers, as seen at *c c*, so as to put them into connection with the main top chamber C, and these perforations are controlled by valves *e*, carried on the inner ends of screwed spindles E, projecting through the front of the top casting and provided with handles *e′*, whereby any desired number of the flow-pipes D may be put into communication with the chamber C.

F F are cast or wrought pipes, preferably screwed into the water-back B, so as to form communication therewith, said pipes extending horizontally across the heating-chamber B′ to within a short distance of the front wall of the furnace, and their ends are stopped, as seen clearly in Fig. 1. These pipes are in horizontal rows, but in diagonal vertical lines, so that each pipe will dodge its upper and lower neighbors, and thus permit the products of combustion to freely ascend between them.

G is the smoke-chamber, located, preferably, at the rear of the water-back, and usually of the full width of the furnace, into which the products of combustion will pass through the space *g*, over the top of the water-back B, said smoke-chamber having upper and lower

outlets G′ G², provided with suitable dampers, whereby the passage of the smoke may be directed to the flue through either opening at will.

That part of the water-back B which forms connection with the series of pipes F F is divided horizontally by diaphragms H H, one diaphragm being opposite the center of each row of pipes, such diaphragms having extensions *h h* entering the pipes for a distance of from one-third to one-half of their length, so as to divide said pipes horizontally for that distance. Said diaphragms are either cast upon or set into the rear wall of the water-back. In addition to these, in some cases I cast upon or set into said water-back zigzag diaphragms L L, so as to separate each diagonal vertical line of pipes, such zigzag diaphragms extending from top to bottom of the series, leaving the upper and lower portions of the water-back clear. The return-pipes M M communicate with the water-jacket at its lower portion through valve-casings *m m*, which contain valves operated by handles N.

Having thus described the construction of my boiler or furnace, I may explain its operation as follows: The water entering the supply or return pipes M passes into the water-jacket *a* and immediately comes under the action of the fire. It then passes upward into the water-back B and enters the lower row of pipes F underneath the diaphragms H and their extensions *h*, and thence over said diaphragms back into the rear chamber B and upward into the next row of pipes, as shown by the arrows in Fig. 1, and so on through the whole series of pipes F and up into the top compartment C through the openings *b b*, being exposed meanwhile to the action of the fire and heat from the products of combustion, and from this chamber C the heated water is admitted to the desired number of flow-pipes D by opening the valves *e*, and in this manner is sent in the required directions through the system of pipes, radiators, &c., throughout the building. The zigzag diaphragms serve to further divide the water into different streams, as will be readily understood. Except when starting the fire the smoke-outlet G′ will seldom be used, as I prefer to lead same off by the lower opening G², as I am thereby enabled to heat the rear wall of the water-back.

It must be understood that I do not limit myself to the precise details of construction and arrangement of parts, as it will be apparent that these may be varied and modified by the exercise of mere mechanical skill without departing from the essential principles of my invention.

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

1. In combination, the fire-chamber surrounded by a water-jacket, a heating chamber above the fire-chamber, having a water-back B at one side, a series of pipes F, held by the inner wall of the water-back and extending into and partially across the heating-chamber, said pipes being closed at their free ends, diaphragms extending into said pipes across the water-back to the outer wall thereof, and a chamber C, extending across the top of the boiler and having communication with the water-back and flow-pipes, substantially as described.

2. The combination, with the fire-chamber having a water-jacket and with the heating-chamber having the horizontal pipes arranged in diagonal rows, of the water-back divided horizontally by diaphragms, extensions of which extend into said pipes, and zigzag diaphragms arranged in vertical rows upon the rear wall of said water-back, so as to separate each diagonal vertical line of pipes, and thus divide the water of circulation into different streams, a top chamber supplied from the different compartments thus formed, and suitable flow-pipes leading therefrom, substantially as and for the purpose specified.

3. In combination with the heating-chamber and water-back, the top chamber C′ in communication with the water-back, the perforated partition C² at the end extending across the chamber, the supplemental partition C³, extending from the end wall of the chamber C to the partition C², the flow-pipes in connection with the spaces formed by said partitions, and the valves, substantially as described.

Montreal, January 10, 1889.

DAVID LANCASTER DWINNELL.

Witnesses:
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