2 Sheets—Sheet 1.

M. HULINGS.

Heating Apparatus for Buildings.

No. 208,822. Patented Oct. 8, 1878.

Fig. 1.

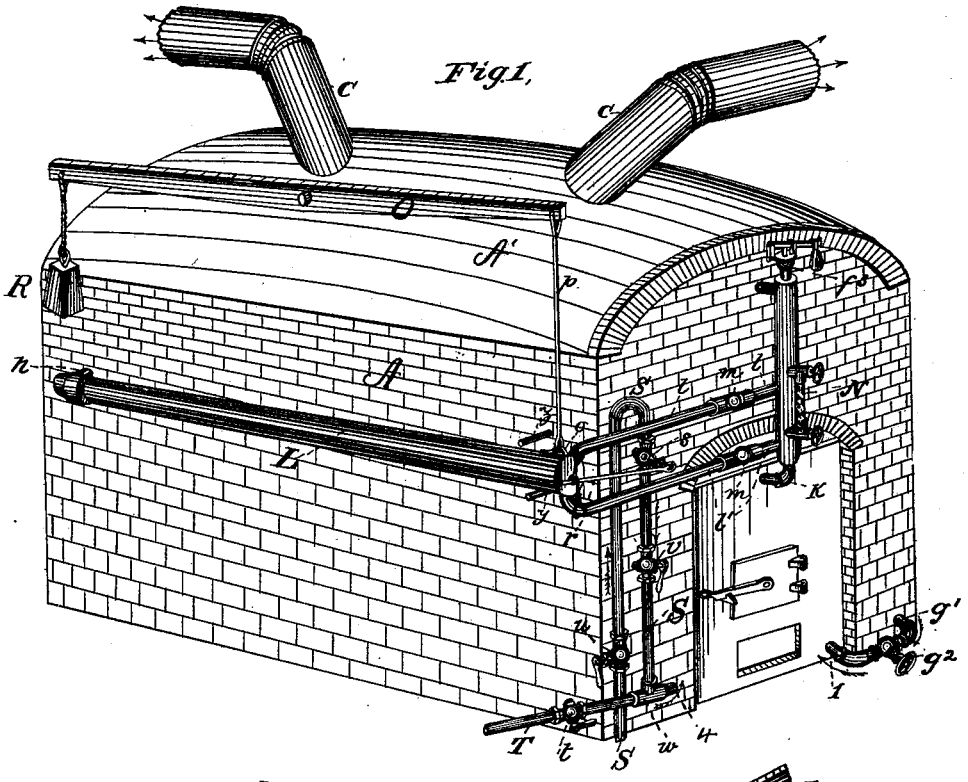
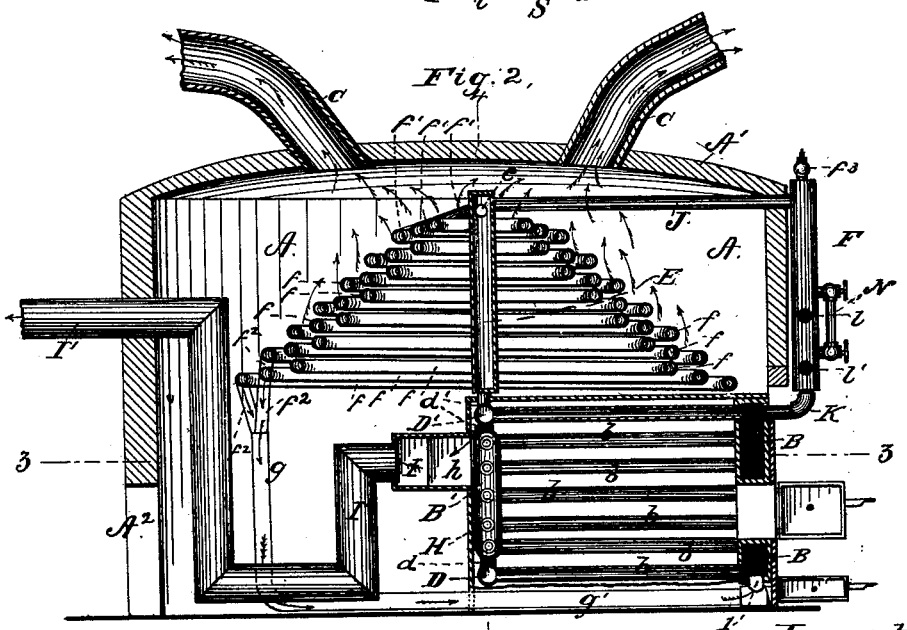


Fig. 2.



Witnesses,
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W. R. Edelen.

Inventor.
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per James L. Pierce
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2 Sheets—Sheet 2.

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Fig. 3.

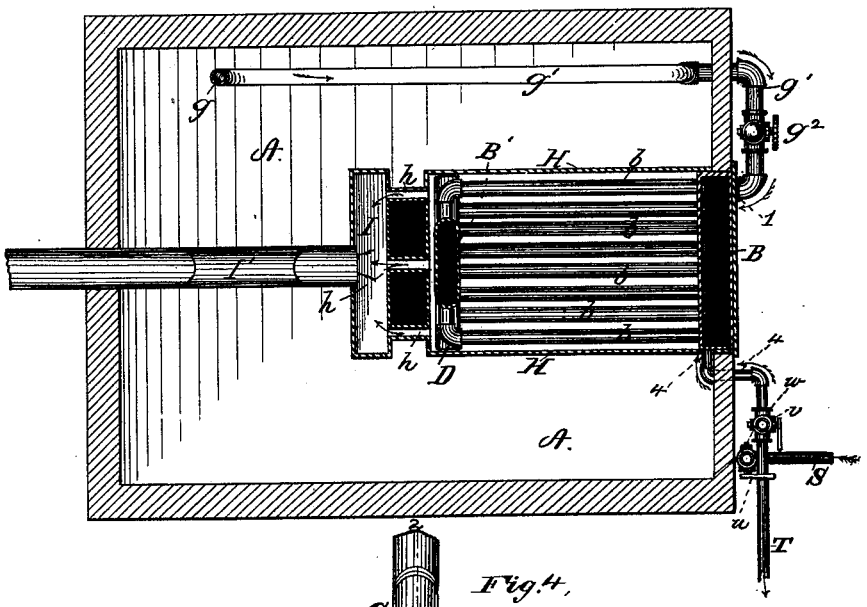
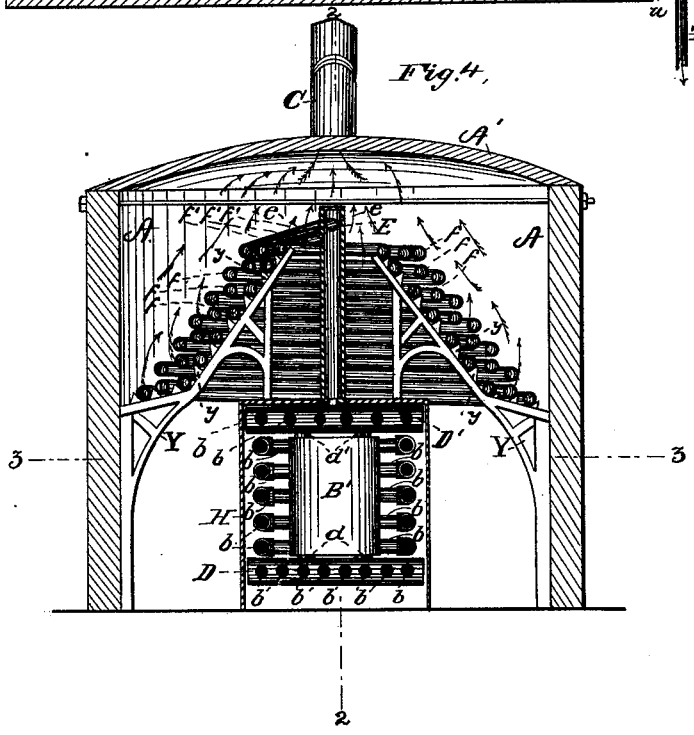


Fig. 4.



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UNITED STATES PATENT OFFICE.

MARCUS HULINGS, OF OIL CITY, PENNSYLVANIA.

IMPROVEMENT IN HEATING APPARATUS FOR BUILDINGS.

Specification forming part of Letters Patent No. **208,822**, dated October 8, 1878; application filed April 24, 1878.

To all whom it may concern:

Be it known that I, MARCUS HULINGS, of the city of Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Heating Apparatus for Buildings; and I do hereby declare that the following is a full, clear, and exact description thereof, which 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 letters of reference marked thereon, which form a part of this specification, in which—

Figure 1 represents a perspective view of my improved heating apparatus. Fig. 2 is a vertical longitudinal section of the same, taken through line 2 2 of Fig. 4. Fig. 3 is a horizontal section taken through line 3 3 of Figs. 2 and 4, with the fire-box tubes in elevation. Fig. 4 is a transverse section through line 4 4 of Fig. 2.

My invention consists of an inclosed chamber made of brick or other suitable materials, and having hot-air conductors communicating with various compartments of a building, and provided with a circulating heater composed of tubes, drums, and various devices for the purpose of radiation.

It also consists of a fire-box composed of a number of tubes, forming the top, sides, and grate-bars of the same, and provided with a light sheet-iron case or inclosure for conducting the smoke, and also for radiation.

It further consists of a radiator composed of a central drum and a stack or nest of tubes, and connecting with other drums and tubes, making a complete circulator.

It further consists of an automatic feeder for regulating the supply of water to my improved heating apparatus.

A represents my closed chamber, having a dome-shaped covering, A^1, provided with hot-air conductors C C, and also with a cold-air duct or entrance, A^2. The top, sides, and grate-bars forming the fire-box proper are composed of a number of tubes, *b b b b*, &c., communicating at the front of the heating apparatus with a water-box, B, and at the rear end with a somewhat similar box, B′, and large horizontal tubes D D′, said horizontal tubes being also connected with box B′ by small pipes *d d′*. The upper tube, *d′*, communicates with the lower end of a vertical pipe or drum, E, said vertical drum being centrally located in a stack or nest of tubes, *f f f*, &c., and provided at its upper end with openings *e e e*, communicating with tubes f^1 f^1 f^1, said tubes connecting with the nest of tubes. The lower end of said nest has secured thereto pipes f^2 f^2 f^2, which discharge in a large tube, *g*, which connects with a horizontal pipe, g^1, that extends on the outside of chamber A, where it is provided with a stop-cock, g^2, and terminates in the bottom of the water-box B, as shown at 1, Figs. 1 and 2.

The upper ends of drums E and F are connected by a pipe, J, which equalizes the pressure and produces a steady circulation when the ebullition of water increases or diminishes from various causes.

The drum F is provided with a safety-valve, f^3, water-gage N, and automatic feed-connections *l l′*. Its lower end communicates with a tube, K. The feed-pipes *l l′* have ball-joints or rubber couplings *m m* to allow the automatic feed-regulator L to move up or down. The regulator L is pivoted at *n*. Its opposite end is supported by a rod, *p*, secured to a staple, *o*, and the end of a pivoted beam, O, said beam having on the opposite end a weight, R, sufficient to balance said regulator L when half-full, or thereabout, of water.

The front end of feeder L rises and falls as the water increases or diminishes, and in so doing operates a lever, *r*, attached thereto, and secured to a cock, *s*, and connecting with a supply-pipe, S. Said pipe is also connected with two other cocks, *u* and *v*, which regulate the supply of water entering the heater at 4. A waste-pipe, T, provided with a cock, *t*, also connects with supply-pipe S for drawing off an over-supply of water from the heater, or for blowing off the same.

The nest of tubing is supported by brackets Y Y, having secured thereon steps *y y y*, &c., for supporting said tubing.

The fire-box is inclosed by a sheet-iron covering, H, having ducts *h h h* leading into a chamber, I, and terminating in a smoke-flue, I′.

In operating my improved heating apparatus, I fill the tubes and chambers with

water until the feed-regulator L closes the cock *s*, and until the water rises to the central part of the water-gage N. The fire is kindled in the fire-chamber, (the top, sides, and grate-bars *b b*, &c., of the same being filled with water,) causing a fierce ebullition through all the tubes and chambers, and generating a constant supply of steam, which passes through drum E, and circulating in the tubes *f f f*, &c., from the top downward, and condenses in the lowermost tubes through the pipes f^2 f^2 f^2 into the conducting-tubes *g* g^1, and finally discharging into the water-chamber B at 1, to be reheated and again pursue the same course.

The sheet-iron fire box inclosure H confines the products of combustion, which are carried through ducts or flues *h h h* into chamber I, thence into the exit smoke-flue I′. The ducts *h h h* and chamber I, as constructed, retard the products of combustion, and produce a greater amount of radiation through the sheet-iron inclosure H, which caloric increases the temperature around the coil of tubes, thus assisting said tubes in generating heat, which is thrown into the inclosed chamber A, and finds an exit through conductors C C, &c., to the various compartments of a building.

The operation of my automatic feed-regulator is as follows: When the water registers about midway in the glass gage N, the feed-regulator is down, resting on pin *y*, the cock *s* being closed. As steam generates it gradually enters through feed-pipe *l* into the feed-regulator L, the water from the latter receding through feed-pipe *l′* into drum F. As the water in the feed-regulator is drawn off the counter-weight R (connected to the beam O) raises the front end of the feed-regulator until stopped by pin *z*, which operates the lever *r* attached thereto, and opens cock *s*, which allows a sufficient quantity of water to enter through supply-pipe S into the water-box B at 4. As the heater gradually fills with water it enters feed-pipe *l′* from drum F into feed-regulator L, and when the latter is about half-filled it acts as a counter-weight to weight R and gradually descends, stopping the supply of water to the heater through the medium of lever *r* and cock *s*. The same operation is continually repeated automatically.

In my improved heating apparatus I do not confine myself to any particular pattern of tubes, drums, or water-boxes; nor do I confine myself to any particular contour of heating-chambers, as many forms would produce the same result, and not alter the principle of my invention.

My feed-regulator and all the connections thereto can be placed on the inside of the heating-chamber and have a gage extending on the outside without in any way interfering with the operation of the same.

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

1. An air-heating chamber having therein a nest of coiled pipes connected to an additionally-inclosed steam or water heater, formed of horizontal water-circulating pipes, constituting a portion of the fire-box, substantially as and for the purpose described.

2. In combination with an air-chamber containing a nest of coiled pipes, a fire-chamber inclosed therein, having horizontal circulating pipes upon its sides, top, and rear, and also as grate-bars, and a water box or boxes in front connected thereto, substantially as and for the purpose set forth.

3. In an inclosed chamber, the combination of a tubular fire-box connected at its opposite ends with tubular drums E and F and an equalizing-pipe, J, by which they are connected, substantially as shown and described.

4. A tubular fire-box and water-boxes B B′, tubes D, and tubular drums E and F, in combination with a nest of tubes, *f*, and return condensing-pipes *g*, substantially as shown and described.

5. A tubular fire-box, in combination with a sheet-metal inclosure, H, flues *h*, chamber I, and exit-flue I′, substantially as shown and described.

6. In combination with the above-described air-heating apparatus, in which water circulates through a series of pipes arranged around the fire-box, and also through a nest of coiled pipes placed in an air-heating chamber, the water feed-regulator, consisting of a tube pivoted at one end to the air-heating chamber and balanced by a weight, and also connected to the induction-cock, substantially as shown and described.

7. In combination with an air-heating apparatus, in which water circulates through a series of inclosed horizontal pipes, and a nest of coiled pipes united by drums E and F and a balanced pipe, L, pivoted at one of its extremities, the connecting-pipes *l* and *l′*, provided with ball or elastic joints *m m*, substantially as and for the purpose described.

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